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SEIDLITZ POWDERS.

By Joseph Huntingdon.

Seidlitz powders, though seemingly prosaic and commonplace, have had quite a fair share of discussion.

Articles are frequently published in pharmaceutical journals in which seidlitz powders are treated of from different points of view, either with regard to the manner in which they are weighed, measured or divided, or as to their chemistry, their medicinal action, or the methods of dispensing them.

Druggists and writers sometimes collect samples from neighboring druggists and examine them to ascertain if they are of the standard required by the Pharmacopœia. Although it may be that considerable pains are taken, and a considerable amount of figuring resorted to, they seem to depend invariably upon the weights of the powders, and, by examining several, to gauge the average weight of the powders of each druggist.

No attempt is made to ascertain if the ingredients are sufficiently pure, or if they have been mixed in the proper proportions, or even if they contain those ingredients.

They might consist almost entirely of worthless or nearly worthless materials, and this might be intentional or unintentional. One of the first things the beginner learns is that seidlitz mixture consists of three parts of rochelle salt and one part of sodium bicarbonate. He has in his mind the figures 3 to 1, and unless his preceptor be watching him, he would possibly reverse the order and put in three parts of sodium bicarbonate and one part of rochelle salt. Simply weighing the powders would not indicate

anything like this, and it would be likely to pass unnoticed when the powders were mixed for drinking.

To make practical tests for the examination of seidlitz powders, materials were taken such as are ordinarily used in the drug store, and first examined qualitatively by the official tests.

The tartaric acid answered the official requirements with the exception of a slight cloudiness with barium chloride test solution. The ash amounted to ·07 per cent. The loss of moisture on drying at 100° C. amounted to about ·027 per cent.

The sodium bicarbonate gave a slight turbidity with silver nitrate test solution, with barium chloride test solution, and a slight coloration with hydrogen sulphide when followed by ammonia water. The loss of weight on heating at 100° C. amounted to 36·58 per cent. The Pharmacopœia gives about 36·3 per cent., a 98·6 per cent. salt being allowed. The theoretical amount for a pure salt is about 36·88 per cent.

The rochelle salt also proved to be very pure. It showed a slight coloration with hydrogen sulphide, and a slight turbidity with silver nitrate test solution. The loss in weight on heating at 100° C. amounted to about 23·35 per cent. Theoretically, rochelle salt contains about 25·52 per cent. of water of crystallization.

The drying of the salts was also tried at a temperature of 50° C., with the object of ascertaining if the adhering moisture could be estimated at that temperature without the loss of water of crystallization, or, in the case of the bicarbonate of soda, without decomposition. It was found that some decomposition did take place, and, also, so much time was required and the results so irregular as to be impracticable. Rochelle salt is somewhat efflorescent at the ordinary temperature in dry air, and sodium bicarbonate is very apt to decompose. Having examined the materials separately as to their quality, the sodium bicarbonate and rochelle salt were mixed in the proportions directed by the Pharmacopœia for seidlitz powders, for the purpose of examining quantitatively.

As both the constituents of seidlitz mixture are salts of alkali metals, they cannot be separated for estimation by precipitation. Nor do the acid radicals form any insoluble salts, so that the only practical way is to take advantage of the behavior of the components towards volumetric solutions before and after ignition.

The experiments made lead to the following suggestions for the qualitative and quantitative examination of seidlitz mixture:

Heated at 74° C. the mixture loses water and carbon dioxide, at a higher temperature is decomposed, froths, becomes brown, and gives off inflammable vapors having the odor of burning sugar, finally leaving a residue consisting of alkaline carbonates mixed with carbon.

With silver nitrate test solution a solution of the mixture yields a white precipitate, which becomes black on boiling. If the white precipitate is dissolved by the addition of a few drops of ammonia water, a silver mirror will be produced on heating. The solution of the mixture, acidified with acetic acid, yields a yellow precipitate on the addition of sodium cobaltic nitrite test solution.

Arsenic, Lead, Copper, etc.—A small quantity of the seidlitz mixture slightly supersaturated with hydrochloric acid, and followed by an equal volume of hydrogen sulphide test solution, should not be rendered turbid.

Iron, Aluminum, etc.—The clear filtrate from the above should not be rendered turbid on slight supersaturation with ammonia water.

Chlorides.—If 1·2 grammes of seidlitz mixture be dissolved in 10 c.c. of dilute nitric acid, then ·5 c.c. of decinormal silver test solution added, and the precipitate, if any, removed by filtration, the clear filtrate should remain unaffected on the further addition of silver nitrate test solution.

Sulphate, Sulphite and Hyposulphite.—If 2·5 grammes of seidlitz mixture be dissolved in 11 c.c. of dilute hydrochloric acid, then ·1 c.c. of nitric acid and ·25 c.c. of decinormal barium chloride test solution added, and the precipitate, if any, removed by filtration, the clear filtrate should remain unaffected by the further addition of barium chloride test solution.

Calcium.—The aqueous solution should not be rendered turbid by ammonium oxalate test solution.

Sulphocyanate.—The aqueous solution slightly supersaturated with hydrochloric acid should not be colored red by a drop of ferric chloride test solution.

Quantitative Tests.—If 2 grammes of the mixture of sodium bicarbonate and rochelle salt be dissolved in water, normal sulphuric acid volumetric solution added until effervescence ceases, and the solution is strongly acid, then boiled for five or ten minutes, phenolphtalein test solution added, and the excess of acid neu-

tralized by normal potassium hydrate volumetric solution, it should be found to require not more than 5·96 c.c. of sulphuric acid volumetric solution to produce a neutral solution (corresponding to 25 per cent. of sodium bicarbonate, each cubic centimetre being the equivalent of ·08385 gramme).

If 2 grammes of the mixture be again taken, this thoroughly ignited in a platinum crucible, the crucible with ash adhering boiled in distilled water until the ash is dissolved, then normal sulphuric acid volumetric solution added in excess as before, boiled, phenolphtalein added, and the excess of acid neutralized with normal potassium hydrate volumetric solution, the number of cubic centimetres of acid found to be required, minus 5·96 (the amount required for the sodium bicarbonate alone), should leave not less than 10·65 c.c. (corresponding to 75 per cent. of rochelle salt, each cubic centimetre being the equivalent of ·140755 gramme).

The Pharmacopœial blue powder containing 2·583 grammes of sodium bicarbonate would require, theoretically, 2·305 grammes of tartaric acid to exactly neutralize 83·85 ($NaHCO_3$) : 74·82 ($\frac{1}{2}H_2C_4H_4O_6$) : : 2·583 : 2·305, while the amount given is 2·25 grammes, leaving a deficiency of nearly 1 grain. It might be claimed that, as the sodium bicarbonate of the Pharmacopœia is allowed to be of only 98·6 purity, this would make an acid solution. Further calculation showed that it does not. If a 100 per cent. pure sodium bicarbonate required 2·305 grammes of tartaric acid, a 98·6 per cent. salt would require 2·273 grammes, 100 : 98·6 : : 2·305 : 2·273. These figures are for a tartaric acid of absolute purity, whereas it is most likely to be at least a fraction of 1 per cent. short of this, while there is good reason to believe that most of the sodium bicarbonate now on the market comes well within the official requirements. The official quantity of tartaric acid, if absolutely pure, would only be equal to a sodium bicarbonate of 97·6 per cent. purity, 2·583 (official quantity) : 2·5215 (equivalent quantity) : : 100 : 97·6.

The tartaric acid was estimated by the official process with potassium hydrate, but to avoid precipitation of potassium bitartrate it is recommended to titrate in hot solutions.

The methods for the examination of seidlitz powders having been described, the results upon six samples are given.

The blue and white powders are considered under separate head-

ings. As the weight is of importance, whether the ingredients are pure or not, the weights of two powders of each druggist are given, followed by the results of tests of identity and of purity, and, finally, the proportions of the ingredients found by quantitative examination.

When the powders obtained came to be examined quantitatively, an unexpected difficulty presented itself. When the percentages of the two ingredients obtained by titration in the described methods were added together, instead of the result being about 100 they all were considerably above that. No. 1, for example, gave 31·44 per cent. of sodium bicarbonate and 85·86 per cent. of rochelle salt, which, added together, make 117·3 per cent. There is only one way in which it can reasonably be explained, that is, by the loss of moisture. In making the first experiments the ingredients were freshly taken from tight containers, so that they had not the chance to lose moisture. The seidlitz powders, on the other hand, contained in paper, a condition highly favorable to loss of moisture, and probably made some time before they were obtained, were kept for some time in a rather hot room before they were examined. Rochelle salt is described by the Pharmacopœia as being somewhat efflorescent, and the results obtained proved that sodium bicarbonate also loses considerable weight under the described conditions. It is obvious, then, that some change in the foregoing calculation would have to be made.

Thus, No. 1, as before mentioned, gave 31·44 per cent. of sodium bicarbonate and 85·86 per cent. of rochelle salt, the total being 117·3 per cent.; then 117·3 : 31·44 : : 100 : 26·805, and in the same way for the rochelle salt, 117·3 : 85·86 : : 100 : 73·1.

All that is necessary with regard to the directions for quantitative analysis would be to make the above calculations in case the results of the analysis give over 100 per cent.

This, however, still leaves something to be desired. It only shows the relative proportions of pure bicarbonate of soda and pure rochelle salt in the mixture. It does not show the absolute amount of pure materials in 100 parts of the mixture; in other words, the two percentages will be always 100. If sodium bicarbonate which contained normal carbonate had been originally used in making the seidlitz mixture, it would not enable the amount of that impurity to be calculated. It would be calculated into bicar-

bonate, and the rochelle salt per cent. correspondingly lessened to make 100.

It would probably convey a better idea of the value of the powders if they were to be compared with the official powders, judging from the amount of anhydrous rochelle salt found in the samples. In this way both the absolute weight of the powders and their composition would be taken into consideration. For this purpose the mean of the two weights given was taken as the average weight of the powders of each druggist, and the total quantity of anhydrous rochelle salt in the sample calculated from the results of the analysis. No. 1 being again taken as the example, the mean of the two weights is 4·55 grammes. Two grammes of the mixture required 12·2 c.c. of normal sulphuric acid to neutralize the ash from the rochelle salt. 12·2 c.c. are equal to 1·279 grammes of anhydrous rochelle salt, ·104835 × 12·2 = 1·278987. If 2 grammes of the mixture contain 1·279 grammes of rochelle salt, 4·55 grammes would contain 2·909 grammes, 2 : 1·279 : : 4·55 : 2·909, so that each of the powders of that particular druggist contains about 3 grammes of anhydrous rochelle salt. The official powder contains about 5·77 grammes of anhydrous rochelle salt.

BLUE POWDERS.

No.	Weights in Grammes.	Results of Qualitative Analysis.	Sodium Bicarbonate.	Rochelle Salt.	Anhydrous Rochelle Salt in Average Powder.
1	4·4 4·7	Traces of iron and chlorides.	26·8 per cent.	73·1 per cent.	3 grammes.
2	10·4 10·5	Traces of iron and sulphates.	23·89 " "	76·1 " "	7·08 "
3	11·85 11·6	Traces of calcium sulphates and iron.	26·32 " "	73·65 " "	7·37 "
4	10·6 10·4	Traces of chlorides and sulphates.	23·48 " "	76·52 " "	7·26 "
5	11· 9·	Trace of sulphates.	41·03 " "	58·52 " "	4·98 "
6	8·4 7·7	Traces of iron chlorides and sulphates.	26·8 " "	73·19 " "	5·21 "
U.S.P.	10·333	—	25·0 " "	75·0 " "	5·77 "

WHITE POWDERS.

No.	Weights in Grammes.	Results of Qualitative Examination.	Estimation.
1	2·42, 2·6	Trace of lead.	99·11 per cent.
2	2·37, 2·289	Traces of sulphates.	99·69 " "
3	2·56, 2·635	Slight trace of lead.	99·8 " "
4	3·275, 3·4	Slight trace of lead.	99·72 " "
5	2·41, 2·34	Trace of sulphates.	98·79 " "
6	2·505, 2·495	Trace of sulphates.	99·23 " "
U.S.P.	2·250	—	—

The tests of identity indicated tartaric acid, and the qualitative tests showed no impurities except those shown in the table.

COMMENTS ON THESE SEIDLITZ POWDERS.

The first powder on the list proved to be a little interesting. Although the ingredients for the blue powder are in about the proper proportions, the powder is about half the weight which it ought to be, while the tartaric acid powder belonging to it is even heavier than it ought to be. There is an excess of nearly 1½ grammes of tartaric acid, so that those powders would make a very acid mixture. It will be noticed that every one of the tartaric acid powders is heavier than the official powder, which is 2·25 grammes in weight, showing plainly the carelessness in preparing them. No. 4 is over 1 gramme heavier than it ought to be.

Nos. 2, 3 and 4 are higher in rochelle salt than the official. No. 5 falls considerably below the official strength, although the powders are about the full weight, the reason being that the mixture contains 41 per cent. of sodium bicarbonate, when it should contain only 25 per cent. Dishonesty was evidently intended in this case. No. 3 is a brand of seidlitz powders regularly put up by a reputable manufacturing firm in this city. It is of very good quality, as can be seen. Sufficient has been shown to indicate that it is necessary to examine seidlitz powders quantitatively if a correct idea of their worth is to be obtained.

SYRUP FERROUS IODIDE.[1]

By H. Lionel Meredith.

This paper is to be regarded as an answer to the query: "Glucose and glycerin have both been recommended as preservatives for syrup ferrous iodide. Does the presence of either or both these substances really improve the keeping quality of this syrup beyond that of the U.S.P. article? If so, suggest a formula." We find that as early as 1857 Mr. Frederick Stearns suggested the use of glycerin as an entire substitute for syrup in preparing this preparation, thus making a sort of glycerite instead of a syrup; and in the following year Dr. Henry Thayer advocated partial replacement of the syrup by this same body, thus preserving the title of the preparation, and obtaining the same effect only to a proportionate degree.

Medicinally, glycerin is not objectionable; indeed, in instances it is to be preferred to syrup. In the first place, because sugars of the disaccharide class of carbohydrates are contraindicated in many diseases; then, too, this class of sugars are not digestible until converted by the stomachic secretions into a type of invert sugar, which change frequently progresses to an advanced stage and produces what is known as "acidity of the stomach," or "fermentative indigestion." Glycerin is open to no such criticism.

The effect of iodine upon sugar was noticed by Lassaigne as early as 1833; that by prolonged boiling of iodine with a solution of cane sugar he obtained a colorless solution; and Millon, in 1845, asserted that iodoform was formed by him by elevating the temperature of a glucose solution to which iodine had been added, the reaction taking place in the presence of an alkaline carbonate.

Prof. John M. Maisch, in 1857, noted that direct sunlight would restore the proper color conditions of a discolored syrup of ferrous iodide, while the sunheat, without sunlight, would not accomplish the same end. The results of these early investigators seem to indicate that preservation and decolorization are brought about by a process of reduction; that as fast as the syrup had been oxidized and iodine liberated, it in turn was reduced and hydriodic acid formed as a product of that reduction.

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[1]Abstract of a paper read at the Maryland Pharmaceutical Association, June, 1900.

To prove that glucose does reduce iodine and forms hydriodic acid, we carried out the following: A glucose solution, neutral reaction, was taken and solution of iodine added until a slight color was imparted to the glucose; a gentle heat was then applied, color disappearing. Reaction was then found to be acid to litmus; with starch paste no color was noted, while upon the addition of a small quantity of chlorine water a deep blue color was obtained. We then took 10 c.c. of the solution, added NH_4OH to neutralization, and titrated with decinormal $AgNO_3$ V. S. (using a few drops K_2CrO_4 T. S. as indicator) until we obtained a permanent pink tint, which required 5·5 c.c. of the $AgNO_3$ V. S., corresponding to ½ per cent. absolute HI. We conclude that hydriodic acid is formed as a product of reduction, and that while the syrup is constantly kept of a light color, it is none the less true that hydriodic acid is being formed.

This being true, we ultimately have a preparation which partakes to a degree, at least, of the nature of an iodine preparation, medicinally, as well as an iron preparation; granting, of course, that this change is an exaggerated incident, as such change would require a long period for consummation, and is merely cited to impress the chemistry of the action of glucose.

NOTE.—Should a preparation of 10 per cent. ferrous iodide in a glucose solution, specific gravity 1·40, be kept so long as to permit of the glucose exercising its limit of reducing influence upon iodine liberated, we would have a preparation containing hydriodic acid about ½ per cent., ferrous iodide, 9·358 per cent. Thus: 10 per cent. by weight of ferrous iodide would contain 14 grammes in 100 c.c. (specific gravity glucose solution, 1·40), of which 11·467 grammes would be iodine. Thus:

Mol. Wgt.	Mol. Wgt.	
FeI_2 :	I_2	: : 14 grammes : X (gramme I).

308·94 : 253·06 : : 14 grammes : X (= 11·4677 grammes I in 14 grammes FeI_2).

308·94 X = 3542·84 grammes.

X = 11·4677 grammes I.

In ½ per cent. HI in glucose (specific gravity, 1·40) we would have 0·7 gramme HI (absolute) in 100 c.c. solution.

Then:

Mol. Wgt.	Atom. Wgt.	
HI :	I	: : 0·7 gramme : X (gramme I).

127·53 : 126·53 : : 0·7 gramme : X (= ·69451 gramme I in 0·7 gramme HI).

This being the *limit* to the reducing power of glucose upon iodine.

Then:

11·4677 grammes I in 10 per cent. FeI_2 (100 c.c.) less
·6945 gramme I in 12 per cent. HI (100 c.c.) equals

10·7732 grammes I remaining as FeI_2.

By way of summary, then, we note that glycerin is a preservative by simply preventing oxidation.

That it assimilates iodine, after liberation, in a non-irritating form, in which form it may be easily taken up by the system, *as iodine*, and does not act as an iron preparation.

That glycerin is not objectionable in the preparation, as it is an easily assimilated food for the organism.

That glucose is a better preservative; in fact, a good, almost ideal preservative, acting, as it does, both by preventing oxidation and reducing the iodine *after* liberation.

That as a product of oxidation we get ferrous oxide and free iodine, and by reduction we have formed hydriodic acid, and ferric sesquioxide by final oxidation.

That, medicinally, glucose is a directly fermentable sugar, easily digested, in fact, a partially predigested food.

That glucose is medicinally valuable, inducing copious polyuria; does not pass into the urine, but is oxidized and consumed in the organism, thus acting as a typical food.

Then:

Mol. Wgt. FeI_2 : Mol. Wgt. I_2 :: X (gramme FeI_2 remaining in 100 c.c.) : 10·7732 grammes I (as FeI_2).

308·94 : 253·06 :: X (gramme FeI_2 remaining in 100 c.c.) : 10·7732 grammes I (as FeI_2).

$253{\cdot}06\ X = 3328{\cdot}232488$ grammes.

$X = 13{\cdot}1124$ grammes FeI_2 remaining in 100 c.c. of preparation.

Now, as we have seen above,

14 grammes = 10 per cent. by weight FeI_2 in glucose preparation (specific gravity, 1·40),

therefore,

13·1124 grammes = 9·358 per cent. by weight FeI_2 remaining after reduction;

remembering that to accomplish this degree of reduction would require a prolonged period of continued decomposition and reduction.

The formula for preparation should read:

Iron (in bright wire)	27 grammes (an excess).
Iodine (resublimed)	86·72 "
Glucose solution (specific gravity, 1·40).	
Distilled water	120 c.c.
To make	1,000 grammes.

Standardize the finished preparation to 10 per cent. by weight strength by the usual method of adding an excess of $\frac{N}{10}$ V. S. $AgNO_3$, diluted HNO_3 and $[Fe_2(NH_4)_2(SO_4)_4 + 24H_2O]$ V. S. and titrating back the excess of $\frac{N}{10}$ V. S. $AgNO_3$ with $\frac{N}{10}$ V. S. KCNS to permanent tinting.

That glucose is found in the normal healthy juices, being the form of sugar into which starchy and saccharine substances are converted by amylopsin and allied ferments, that they may become soluble, digestible compounds.

For a working formula for syrup ferrous iodide with glycerin we find that by replacing half the syrup by glycerin a much more stable preparation is obtained than by the entire substitution of glycerin for syrup. Then, too, heat in excess should be avoided with the finished preparation, lest a more or less disagreeable odor be developed of an "allyl" character. For these experiments we used the formula as prescribed by the U.S.P., with the changes noted above. We *do not* consider the use of glycerin at all advantageous.

For the formula for the use of glucose we first prepared a glucose solution of 1·40 specific gravity (as this high specific gravity is less likely to undergo acetous fermentation) and used the spirit of the U.S.P. formula. First experiment showed in a short time a precipitate at first flocculent, finally more or less dense.

Upon carrying out a few tests, we discovered the presence of a trace of sulphates and an abundance of chlorides; after eliminating the chlorides with silver nitrate, T. S. (in treating the glucose solution, with the object of eliminating chlorides, the solution (specific gravity, 1·40) was reduced to one having a specific gravity 1·10, and titrated with $Ag.NO_3$, T. S., until no further trace of chlorides was noted; filtered and again concentrated to specific gravity 1·40, we again carried out the above experiment, using the glucose solution; specific gravity, 1·40, reaction neutral. The result was a clear, permanent preparation.

We then tried half syrup and half glucose solution, with like result; yet this latter would not necessarily be as permanent as the preceding.

After two months' standing each specimen showed a *slightly* acid reaction. In closing this article, we wish to make prominent a few points to be observed in making the official syrup, the non-observance of which is the cause of much of the decomposition met with in practice. The sugar should be free from ultramarine, as this will cause a slight reddening of the finished syrup.

The specific gravity should be at least 1·35.

The water used should be distilled and free from ammonia, as ferrous iodide is an excellent reagent for this gas, and with it gives a yellowish-brown coloration.

Observe that oxidation does not begin before the preparation has been finished.

Remember that a darkening color does not always indicate presence of iodine; it may be due to the fact that caramelization has begun.

It is bad pharmacy to reclaim syrup ferrous iodide too often.

Always boil the water before using, to dispel ammonia, carbon dioxide and other volatile impurities.

It is a good point when following the official directions to "heat the solution to boiling," after "having lost the odor of iodine," to *heat the solution in a water-bath*, for by the use of direct heat the solution is often slightly reddened, due to a scorching caused by too high temperature.

Filter always through rapid-acting Swiss (or otherwise pure) filter paper.

We deem it a good plan to heat the finished syrup to boiling, to dispel any free iodine, by converting it to hydriodic acid by the aid of the invert sugar caused by boiling the cane sugar solution.

ASSAY OF DRUGS BY THE USE OF LIVING PLANTS.[1]

By Henry Kraemer.

While I have a certain amount of hesitation in presenting the results recorded in this paper at the present time, it nevertheless seems to me that more would be gained by such a procedure than by withholding them for a longer time in order to accumulate more data, and in support of this position permit me to quote the following from Montesquieu: "When you treat a subject, it is not necessary to exhaust it, it is enough if you cause thought."

The subject of the testing of drugs by means of their effects upon living plants is not an entirely new one, as I supposed and ventured to state in my paper on "The Valuation of Drugs and Foods" a year ago. In fact, methods of this kind have been employed to a considerable extent in Europe and appear to be of fundamental importance in ascertaining the toxic properties and therapeutic value of drugs. No less an authority than Kobert, in his "Lehrbuch der Intoxicationen" (1893), says that, after one has obtained the substance relatively pure and made a neutral solution, "Der Gang der Untersuchung ist nun der, dass man erst den Einfluss auf möglichst

[1] Presented at the American Pharmaceutical Association meeting, May, 1900.

niedrige Wesen pflanzlicher und thierischer Natur, dann auf höhere kaltblutige und deren einzelne möglichst isolirte Organe oder Stückchen derselben und zuletzt auf die Warmblüter in aufsteigender Reihe untersucht, so dass von Längern erst Pflanzenfresser, dann Fleischfresser, dann Omnivoren, dann körner- und fleischfressende Vögel und erst dann Menschen als Reagens benutzt werden und zwar zuerst der Experimentator, dann andere gesunde Menschen, dann Patienten. *Das Leibmotiv für alle Versuche und namentlich für die Reihenfolge derselben soll das Mitgefühl für die armen gequälten Geschöpfe sein.* Man stellte daher Punkte, welche an niederen Wesen untersucht werden können, nicht ohne Noth an höheren fest. Das am wenigsten gequälte Wesen soll natürlich der kranke Mitmensch sein. Es muss daher als ein Act der Barberei und mangelhaftiger pharmakologischer Erziehung gebrandmarkt werden, dass sich noch immer Aerzte finden lassen, welche Mittel von schwankender oder unbekannter Zusammensetzung und Wirkung sofort an den Patienten ihrer Praxis aufs Gerathewohl hin zu früfen sich bereit finden lassen."

The following plants or parts of them have been employed in experiments of this kind: bacteria, Oscillaria, Spirulina, Nostoc, Zygnema, Spirogyra, Chara, Drosera, Tradescantia, yeasts, species of mucor, Elodea, Lemna, Pistia, Potamogeton, Myriophyllum, Ceratophyllum, grasses, lentels, beans, peas, etc. (See Kobert, *loc. cit.*)

The data herewith presented are the results of experiments which were carried out under my direction by Willard Ohliger in the Botanical Laboratory of the Philadelphia College of Pharmacy. When the work was undertaken it was hoped that a number of drugs could be experimented with and also a number of plants, but up to the present it has been found impossible to extend the experiments further than those which follow. The plants used in these experiments were: Seedlings of *Lupinus albus* and *Pisum sativum*, L. The following are the substances which were used in experimenting upon these plants: Ethyl alcohol, strychnine nitrate, brucine sulphate, tincture of nux vomica, U.S.P., and tincture of nux vomica free from fat.

METHOD OF TESTING.

The seeds of the above-named plants were first soaked in water for twenty-four hours, after which they were placed on moistened excelsior, arranged in such a manner as to be covered with a bell-

jar. This was then placed in a dark room and germination of the seeds allowed to proceed until the radicles acquired a length of from 25 to 30 millimetres. The radicles were then marked with India ink 20 millimetres from their tips and placed in the solutions of the different drugs. The containers used for the solutions were 50 c.c. glass vials, which were perfectly clean. The method found best adapted for supporting the seedlings was as follows: The vials containing the solutions were arranged in a circle on a plate and a large cork placed over them in such a way as to come partly over the mouth of each vial. To this cork the seedlings were attached by means of small staples or double-pointed tacks, so as to immerse the radicles in the solutions. The vials were then covered with a bell-jar and placed in a dark room. After a period of twenty-four hours the seedlings were removed from the solutions, and the radicles carefully measured to ascertain their length of growth. They were then replaced in the solutions and allowed to stand another twenty-four hours, when measurements were again made.

In cases of death the radicles presented a flabby and transparent appearance, and in a few cases they were shorter than at the beginning of the experiment.

In the first series of experiments alcoholic solutions were employed in order to obtain the constant for that liquid, as it was likely to be employed in the preparation of the solutions of the various drugs to be tested.

The following table gives the strength of alcohol employed, the actual growth of two seedlings of *Pisum sativum* and two of *Lupinus albus* in twenty-four hours and the temperature at which the experiments were performed, this temperature being adopted likewise for the succeeding experiments.

In the following experiments it is seen that no growth of the root occurred in the solution containing 7 per cent. of alcohol, and that in the solutions containing between 6 per cent. and ·5 per cent. there was a gradual increase in the length of the root according as the strength of alcohol in the solution was diminished, and that in the solutions containing ·1 per cent. and ·5 per cent. there was a slight increase in growth over those contained in weaker solutions. It may be stated here that in distilled water *Pisum sativum* grew 18 millimetres and *Lupinus albus* 19 millimetres in twenty-four hours.

In the succeeding table the lengths of the roots at the end of the second twenty-four hours are given:

ETHYL ALCOHOL.

Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
·01	9· mm. 9· "	Apparently normal	14·5 mm. 15· "	Apparently normal.
·1	10·5 " 11· "	Crooked	16· " 16·5 "	" "
·5	10· " 10· "	Apparently normal	15·5 " 15·5 "	" "
1·	8·5 " 8·5 "	" "	13· " 14· "	" "
2·	8· " 8· "	" "	11·5 " 12·5 "	" "
3·	6· " 7· "	" "	9· " 8·5 "	" "
4·	4· " 4·5 "	" "	5· " 4·5 "	" "
5·	2· " 2· "	" "	2· " 1· "	"
6·	1· " 1· "	" "	No growth	Dead, flabby.
7·	No growth	Dead, flabby	—	—

ETHYL ALCOHOL.

Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
·01	15· mm. 15· "	Apparently normal	19·5 mm. 20· "	Apparently normal.
·1	16·5 " 17· "	Crooked	22· " 22· "	" "
·5	16· " 16· "	Apparently normal	21· " 21· "	"
1·	13· " 12·5 "	" "	18· " 19· "	" "
2·	11· " 11· "	" "	14·5 " 15·5 "	"
3·	8·5 " 9·5 "	" "	13· " 13· "	"
4·	5· " 5· "	" "	5·5 " 5·5 "	"
5·	2· " 2· "	" "	2· " 1· "	" "
6·	1· " 1· "	Flabby	No growth	Dead.
7·	No growth	Dead	—	—

STRYCHNINE NITRATE.

Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/200 gr. or .0022 gm.	10. mm. 10. "	Apparently normal	15.5 mm. 15.5 "	Apparently normal.
1/150 gr. or .0032 gm.	8.5 " 9. "	" "	15. " 15. "	" "
1/100 gr. or .0043 gm.	10.5 " 10.5 "	" "	16. " 16. "	" "
1/75 gr. or .0054 gm.	6. " 5.5 "	" "	10. " 10. "	" "
1/50 gr. or .0065 gm.	5. " 5. "	" "	8.5 " 7.5 "	" "
1/4 gr. or .013 gm.	4.5 " 4. "	" "	6.5 " 6. "	" "
1/2 gr. or .025 gm.	3. " 3. "	" "	4.5 " 4. "	" "
3/4 gr. or .039 gm.	2. " 1.5 "	" "	3. " 3. "	" "
1 gr. or .052 gm.	1. " 1. "	" "	2. " 2. "	" "
1 gr. or .065 gm.	No growth	Dead, flabby	No growth	Dead, flabby.

STRYCHNINE NITRATE.

Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/200 gr. or .0022 gm.	16. mm. 16. "	Apparently normal	25. mm. 25. "	Apparently normal.
1/150 gr. or .0032 gm.	15.5 " 15. "	" "	24. " 24. "	" "
1/100 gr. or .0043 gm.	17. " 17. "	" "	26. " 26. "	" "
1/75 gr. or .0054 gm.	14. " 13. "	" "	22. " 22. "	" "
1/50 gr. or .0065 gm.	7. " 7. "	" "	9. " 8. "	" "
1/4 gr. or .013 gm.	5.5 " 6. "	" "	7. " 6. "	" "
1/2 gr. or .025 gm.	4. " 4. "	" "	5. " 5. "	" "
3/4 gr. or .039 gm.	2. " 2. "	" "	3.5 " 3. "	" "
1 gr. or .052 gm.	1.5 " 1.5 "	Transparent	2.5 " 2. "	Transparent.
1 gr. or .065 gm.	No growth	Dead	No growth	Dead.

BRUCINE SULPHATE.

Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/30 gr. or .0022 gm.	10·5 mm. 10·5 "	Apparently normal	16· mm. 16·5 "	Apparently normal.
1/20 gr. or .0032 gm.	9· " 9·5 "	" "	15· " 15·5 "	" "
1/15 gr. or .0043 gm.	11· " 12· "	" "	16·5 " 17· "	" "
1/12 gr. or .0054 gm.	11·5 " 13· "	" "	17· " 17·5 "	" "
1/10 gr. or .0065 gm.	7·5 " 7· "	" "	10· " 11· "	" "
1/8 gr. or .013 gm.	6· " 6·5 "	" "	9· " 9·5 "	" "
1/6 gr. or .025 gm.	5· " 5· "	" "	6· " 6· "	" "
1/4 gr. or .039 gm.	3·5 " 3· "	" "	4· " 4·5 "	" "
1/3 gr. or .052 gm.	2· " 2· "	" "	3· " 3· "	" "
1 gr. or .065 gm.	No growth	Dead	2· " 2·5 "	" "
1 1/2 gr. or .078 gm.	—	—	No growth	Dead.

These experiments show that the seedlings growing in the solution containing but .01 per cent. alcohol still grew slightly less than those in the solutions containing .1 per cent. and .5 per cent. alcohol, and that in the solutions containing over 5 per cent. there was no further growth.

In the experiments tabulated on p. 476 aqueous solutions of strychnine nitrate (Merck's) containing the following amounts of the alkaloid to 50 c.c. of distilled water were used: 1/30 grain, 1/20 grain, 1/15 grain, 1/12 grain, 1/10 grain, 1/8 grain, 2/8 grain, 3/8 grain, 4/8 grain, 1 grain.

It is interesting to note that in the above experiments the maximum growth of both the *Pisum sativum* and *Lupinus albus* occurred in the solution containing 1/15 grain of the alkaloid, while those in solutions of weaker strength grew slightly less. The solution which proved toxic contained 1 grain of strychnine in 50 c.c. of distilled water.

In the second table on p. 476 the lengths of the roots at the end of the second twenty-four hours are given.

These experiments show that the seedlings growing in the $\frac{1}{160}$-grain solution still grew more than those in solutions of $\frac{1}{300}$ and $\frac{1}{200}$ grain, and that in solutions containing between $\frac{1}{160}$ and 1 grain there was a gradual decrease in growth as the amount of strychnine was increased.

The table on p. 477 gives the results with solutions of brucine sulphate (Merck's) containing $\frac{1}{300}$ grain, $\frac{1}{200}$ grain, $\frac{1}{160}$ grain, $\frac{1}{120}$ grain, $\frac{1}{100}$ grain, $\frac{1}{60}$ grain, $\frac{2}{60}$ grain, $\frac{3}{60}$ grain, $\frac{4}{60}$ grain, 1 grain in 50 c.c. of distilled water.

Comparing the above experiments with those in which strychnine was employed, we notice that the growth of the seedlings in all cases was slightly more than that in the corresponding strengths of strychnine, and that death occurred in the solution containing $1\frac{1}{60}$ grain of the alkaloid, whereas with strychnine the toxic percentage was 1 grain in 50 c.c. of water.

The following experiments give the results at the end of the second twenty-four hours:

BRUCINE SULPHATE.

Temperature (16°-21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{300}$ gr. or ·0022 gm.	16·5 mm. 16· "	Apparently normal	25·5 mm. 25· "	Apparently normal.
$\frac{1}{200}$ gr. or ·0032 gm.	15·5 " 15·5 "	" "	24· " 24·5 "	" "
$\frac{1}{150}$ gr. or ·0043 gm.	17·5 " 18· "	" "	26· " 26·5 "	" "
$\frac{1}{120}$ gr. or ·0054 gm.	18· " 18·5 "	" "	27· " 27· "	" "
$\frac{1}{100}$ gr. or ·0065 gm.	10· " 10· "	" "	14· " 14· "	" "
$\frac{1}{75}$ gr. or ·013 gm.	8· " 9· "	" "	12· " 12·5 "	" "
$\frac{1}{60}$ gr. or ·025 gm.	6· " 6· "	" "	7· " 7· "	" "
$\frac{1}{50}$ gr. or ·039 gm.	3·5 " 4· "	" "	5· " 5· "	" "
$\frac{1}{40}$ gr. or ·052 gm.	3· " 3· "	" "	3·5 " 3·5 "	" "
1 gr. or ·065 gm.	No growth	Dead, flabby	2·5 " 3· "	" "
$1\frac{1}{60}$ gr. or ·078 gm.	—	—	No growth	Dead, flabby.

In the above experiments, as in those of the first twenty-four hours, we notice an increase of growth over that in the corresponding strengths of strychnine.

A series of experiments upon alcoholic solutions of strychnine nitrate (Merck's) containing $\frac{1}{20}$ grain, $\frac{1}{10}$ grain, $\frac{1}{8}$ grain, $\frac{1}{6}$ grain of the alkaloid to 50 c.c. of the solution were carried out, with the following results:

STRYCHNINE NITRATE AND ETHYL ALCOHOL.

Strychnine nitrate . . 0·3 gm.
Alcohol, 94 per cent. . 75 c.c.
Water . . . . . 25 c.c.
Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{20}$ gr. in 50 c.c. of sol. or 1 c.c. sol. H_2O q.s. 50 c.c.	5· mm. 5·5 "	Apparently normal	9· mm. 9·5 "	Apparently normal.
$\frac{1}{10}$ gr. in 50 c.c. of sol. or 2 c.c. sol. H_2O q.s. 50 c.c.	2·5 " 2· "	" "	4· " 4· "	" "
$\frac{1}{8}$ gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	1·5 " 2· "	" "	3· " 3· "	" "
$\frac{1}{6}$ gr. in 50 c c. of sol. or 4 c.c. sol. H_2O q.s. 50 c c.	No growth	Dead, flabby	No growth	Dead, flabby.

STRYCHNINE NITRATE AND ETHYL ALCOHOL.

Strychnine nitrate . . 0·3 gm.
Alcohol, 94 per cent. . 75 c.c.
Water . . . . . 25 c.c.
Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{20}$ gr. in 50 c.c. of sol. or 1 c.c. sol. H_2O q.s. 50 c.c.	6· mm. 6· "	Apparently normal	14· mm. 15· "	Apparently normal.
$\frac{1}{10}$ gr. in 50 c.c. of sol. or 2 c.c. sol. H_2O q.s. 50 c.c.	3· " 3·5 "	" "	5· " 5· "	" "
$\frac{1}{8}$ gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	2· " 2·5 "	" "	4· " 4· "	" "
$\frac{1}{6}$ gr. in 50 c.c. of sol. or 4 c.c. sol. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

In the above experiments, the maximum growth of the seedlings occurred in the solution containing $\frac{1}{20}$ grain alkaloid in 50 c.c. of the alcoholic solution, and death in the solution containing $\frac{1}{8}$ grain.

The succeeding table on p. 479 gives the results at the end of the second twenty-four hours.

In the second twenty-four hours we notice a corresponding increase in growth, as was noted in previous experiments.

BRUCINE SULPHATE AND ETHYL ALCOHOL.

Brucine sulphate . . . 0·3 gm.
Alcohol, 94 per cent. . 75 c.c.
Water . . . . . 25 c.c.
Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{20}$ gr. in 50 c.c. of sol. or 1 c.c. sol. H_2O q.s. 50 c.c.	6· mm. 6· "	Apparently normal	10· mm. 10· "	Apparently normal.
$\frac{1}{10}$ gr. in 50 c.c. of sol. or 2 c.c. sol. H_2O q.s. 50 c.c.	3·5 " 4· "	" "	5·5 " 6· "	" "
$\frac{1}{8}$ gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	2·5 " 3· "	" "	4·5 " 4·5 "	" "
$\frac{1}{4}$ gr. in 50 c.c. of sol. or 4 c.c. sol. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

BRUCINE SULPHATE AND ETHYL ALCOHOL.

Brucine sulphate . . . . 0·3 gm.
Alcohol, 94 per cent. . . 75 c.c.
Water . . . . . 25 c.c.
Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{20}$ gr. in 50 c.c. of sol. or 1 c.c. sol. H_2O q.s. 50 c.c.	7· mm. 7· "	Apparently normal	16· mm. 16· "	Apparently normal.
$\frac{1}{10}$ gr. in 50 c.c. of sol. or 2 c.c. sol. H_2O q.s. 50 c.c.	4·5 " 4·5 "	" "	7· " 7·5 "	" "
$\frac{1}{8}$ gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	4· " 3·5 "	" "	6· " 6·5 "	" "
$\frac{1}{4}$ gr. in 50 c.c. of sol. or 4 c.c. sol. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

In the experiments in the first table on p. 480, alcoholic solutions of brucine sulphate containing $\frac{1}{20}$ grain, $\frac{1}{10}$ grain, $\frac{1}{5}$ grain and $\frac{1}{8}$ grain of the alkaloid to 50 c.c. of the solution were used.

In these experiments with brucine, alcohol and water, we again notice an increase in growth over the experiments with strychnine, thus tending to show that brucine is a less powerful alkaloid upon plants than strychnine.

The succeeding table gives the results of the experiments at the end of the second twenty-four hours.

In the second twenty-four hours the same conditions remain throughout the experiment; the maximum growth occurred in the solution containing $\frac{1}{20}$ grain and death in the $\frac{1}{8}$ grain solution.

In the following table are given the results with alcoholic solutions of strychnine nitrate and brucine sulphate, containing $\frac{1}{20}$ grain, $\frac{1}{10}$ grain, $\frac{1}{5}$ grain and $\frac{1}{8}$ grain of the alkaloids in equal proportion to 50 c.c. of the solution:

STRYCHNINE NITRATE, BRUCINE SULPHATE AND ETHYL ALCOHOL.

Strychnine nitrate . . . 0·15 gm.
Brucine sulphate . . . . 0·15 gm.
Alcohol, 94 per cent. . . 75 c.c.
Water . . . . . 25 c.c.

Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
$\frac{1}{20}$ gr. in 50 c.c. of sol. or 1 c. c. sol. H_2O q. s. 50 c.c.	6· mm. 7· "	Apparently normal	10· mm. 11·5 "	Apparently normal.
$\frac{1}{10}$ gr. in 50 c.c. of sol. or 2 c.c. sol. H_2O q. s. 50 c.c.	3· " 3· "	" "	5· " 5·5 "	" "
$\frac{1}{5}$ gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	2· " 2· "	" "	3·5 " 3·5 "	" "
$\frac{1}{8}$ gr. in 50 c.c. of sol. or 4 c.c. sol. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

Comparing the above experiments with those of strychnine and alcohol and brucine and alcohol, we observe an increase in the growth of the seedlings over that in strychnine and alcohol, and a slight decrease under that in brucine and alcohol.

The following table gives the results with strychnine, brucine and alcohol at the end of the second twenty-four hours:

STRYCHNINE NITRATE, BRUCINE SULPHATE AND ETHYL ALCOHOL.

Strychnine nitrate . . 0·15 gm.
Brucine sulphate . . . 0·15 gm.
Alcohol, 94 per cent. . 75 c.c.
Water . . . . . 25 c.c.

Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/10 gr. in 50 c.c. of sol. or 1 c.c. sol. H_2O q.s. 50 c.c.	7· mm. 8· "	Apparently normal	1·7 mm. 1·8 "	Apparently normal.
1/20 gr. in 50 c c. of sol. or 2 c c. sol. H_2O q s. 50 c.c.	4· " 4· "	" "	6· " 6·5 "	" "
1/40 gr. in 50 c.c. of sol. or 2½ c.c. sol. H_2O q.s. 50 c.c.	3· " 3· "	" "	4·5 " 4·5 "	" "
1/80 gr. in 50 c c. of sol. or 4 c.c. sol. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

TINCTURE OF NUX VOMICA (FREE FROM FAT).

Temperature (16°–21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/10 gr. alkaloids in 50 c c. or ½ c.c. tinct. H_2O q.s. 50 c.c.	4 mm. 4· "	Apparently normal	9· mm. 9·5 "	Apparently normal.
1/20 gr. alkaloids in 50 c c. or ½ c c. tinct. H_2O q.s. 50 c c.	3· " 3· "	" "	6· " 7· "	" "
1/40 gr. alkaloids in 50 c.c. or 1 c c. tinct. H_2O q.s. 50 c.c.	2· " 2·5 "	" "	4· " 4· "	" "
1/80 gr. alkaloids in 50 c.c. or 2 c.c. tinct. H_2O q.s. 50 c c.	1·5 " 1·5 "	" "	2·5 " 3· "	" "
½ gr. alkaloids in 50 c.c. or 2½ c c. tinct. H_2O q.s. 50 c c.	1· " 1· "	" "	2· " 2· "	" "
¼ gr. alkaloids in 50 c c. or 4 c.c. tinct. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

In the second twenty-four hours the same conditions are evident.

In the second table on p. 482 are given the detailed results with a tincture of nux vomica of U.S.P. strength (0·3 gramme of total alkaloids in 100 c.c. of tincture) from which the oil had been extracted. 13·332 grammes of the powdered drug, the amount used in making 100 c.c. of the U.S.P. tincture, contained ·750 gramme of oil or 5·62 per cent.

In the foregoing, it is seen that no growth of the radicle occurred in the solution containing 4 c.c. of the tincture, and that between 4 c.c. and ¼ c.c. there was a gradual increase in length according as the strength of tincture in the solution was decreased.

In the following experiments are given the results at the end of the second twenty-four hours:

TINCTURE OF NUX VOMICA (FREE FROM FAT).

Temperature (16°–21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
⅒ gr. alkaloids in 50 c.c. or ½ c.c. tinct. H_2O q.s. 50 c.c.	5· mm. 5· "	Apparently normal	15· mm. 15·5 "	Apparently normal.
⅒ gr. alkaloids in 50 c.c. or ½ c.c. tinct. H_2O q.s. 50 c.c.	3·5 " 3·5 "	" "	6·5 " 7·5 "	" "
⅒ gr. alkaloids in 50 c c. or 1 c.c. tinct. H_2O q.s. 50 c.c.	3· " 3· "	" "	5· " 5· "	" "
⅒ gr. alkaloids in 50 c.c. or 2 c.c. tinct. H_2O q.s. 50 c.c.	1·5 " 1·5 "	No further growth	2·5 " 3· "	No further growth.
¼ gr. alkaloids in 50 c.c. or 2½ c.c. tinct. H_2O q.s. 50 c.c.	1· " 1· "	" " "	2· " 2· "	" " "
½ gr. alkaloids in 50 c.c. or 4 c.c. tinct. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

The seedlings in the solutions containing ¼ c.c., ½ c.c. and 1 c.c. of the tincture show a slight increase in growth during the second twenty-four hours, while those in solutions containing 2 c.c. and 2½ c.c. show no further growth.

The following table gives the results with a tincture of nux vomica U.S.P. strength (0·3 gramme of total alkaloids in 100 c.c. of tincture) from which the fat has not been extracted:

TINCTURE OF NUX VOMICA, U.S.P.

Temperature (16°-21° C.). *First 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/10 gr. alkaloids in 50 c.c. or 1/2 c.c. tinct. H_2O q.s. 50 c.c.	5· mm. 5· "	Apparently normal	10· mm. 10· "	Apparently normal.
1/20 gr. alkaloids in 50 c.c. or 1/2 c.c. tinct. H_2O q.s. 50 c.c.	4· " 4· "	" "	8·5 " 9· "	" "
1/30 gr. alkaloids in 50 c.c. or 1 c.c. tinct. H_2O q.s. 50 c.c.	3· " 3· "	" "	5· " 5· "	" "
1/50 gr. alkaloids in 50 c.c. or 2 c.c. tinct. H_2O q.s. 50 c.c.	2· " 2· "	" "	3· " 3·5 "	" "
1/100 gr. alkaloids in 50 c.c. or 2 1/2 c.c. tinct. H_2O q.s. 50 c.c.	1·5 " 1· "	" "	2· " 2·5 "	" "
1/200 gr. alkaloids in 50 c.c. or 4 c.c. tinct. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

Comparing the above results with those of tincture of nux vomica free from fat, it will be seen that there is a slight increase in the growth.

TINCTURE OF NUX VOMICA, U.S.P.

Temperature (16°-21° C.). *Second 24 Hours.*

Per Cent.	Pisum Sativum.		Lupinus Albus.	
	Actual Growth.	Remarks.	Actual Growth.	Remarks.
1/10 gr. alkaloids in 50 c.c. or 1/2 c.c. tinct. H_2O q.s. 50 c.c.	6· mm. 6· "	Apparently normal	16· mm. 16· "	Apparently normal.
1/20 gr. alkaloids in 50 c.c. or 1/2 c.c. tinct. H_2O q.s. 50 c.c.	4·5 " 5· "	" "	9·5 " 9·5 "	" "
1/30 gr. alkaloids in 50 c.c. or 1 c.c. tinct. H_2O q.s. 50 c.c.	3·5 " 3·5 "	" "	6· " 7· "	" "
1/50 gr. alkaloids in 50 c.c. or 2 c.c. tinct. H_2O q.s. 50 c.c.	2· " 2· "	No further growth	3· " 3·5 "	No further growth.
1/100 gr. alkaloids in 50 c.c. or 2 1/2 c.c. tinct. H_2O q.s. 50 c.c.	1·5 " 1· "	" " "	2· " 2·5 "	" " "
1/200 gr. alkaloids in 50 c.c. or 4 c.c. tinct. H_2O q.s. 50 c.c.	No growth	Dead, flabby	No growth	Dead, flabby.

The succeeding table gives the results with tincture of nux vomica (fat) at the end of the second twenty-four hours.

In these experiments we still notice an increase in the growth of the radicle over that of tincture of nux vomica free from fat.

CONCLUSION.

At the present time, when the assaying of drugs is of so much importance to the physician and also to the pharmacist, it is needless to say that any methods which will enable us to arrive at results which can be used directly or calculated so as indirectly to be of value to the professions are of considerable importance. The question arises, how can the figures obtained be translated so as to be of practical value. From the results obtained we may say generally that the rate of growth of the radicles in the solutions containing toxic principles is inversely proportional to the toxicity of the solution.

The results of the foregoing experiments tend to show that there is a definite solution of alcohol or nux vomica alkaloids that is toxic, and that with solutions containing different amounts of alcohol or nux vomica alkaloids there is a definite measure of growth depending upon the quantity contained therein. Inasmuch as this is to be taken as a measure of the amount of alcohol or alkaloids affecting the plants experimented upon, it is seen that we have here a direct means of measuring the quantity of alcohol or alkaloids in the respective solutions.

RECOLLECTIONS AND REMINISCENCES OF PROF. WM. PROCTER, JR.

In response to a letter from the editor of this JOURNAL, the following letters containing some recollections and reminiscences of Professor Procter have been received:

"DEAR SIR:—I became personally acquainted with Professor Procter in 1868, and subsequently have met him occasionally in Philadelphia, in New York and at the annual meetings of the American Pharmaceutical Association. When in Philadelphia I called upon him, and he upon me when in New York. Being of a retiring disposition, Professor Procter was at first reticent with strangers, but a genial and sympathetic companion and friend when better acquainted.

He was always eager to learn, and enjoyed reminiscences of his European trip in 1867, frequently expressing his regret how much he believed to have missed while in Germany on account of being insufficiently familiar with the German language.

"Percolation was then in its infancy, and he rejoiced in having an opportunity at one of my visits of showing and demonstrating to me in the laboratory adjoining his drug store the process and the various percolators then used by him. At several of his calls at my home he much enjoyed my collection of microscopical slides of plant drugs. He was not used to microscopic technique, and expressed his regret of not having had in younger years the opportunity of becoming familiar with the use of the microscope, whose importance for application in pharmacy he promptly recognized. He was particularly delighted on being shown the beautiful color reaction in freshly cut slides by the action of iodine solution upon the otherwise hardly visible starch granules in vegetable cellular tissue.

"Being closely engaged in attending to my drug business and to microscopical and analytical work imposed upon me by medical practitioners, it was chiefly on Professor Procter's solicitation that I undertook in 1869 to prepare the annual report on the progress of pharmacy for the American Pharmaceutical Association. He subsequently made, jointly with Professor Maisch and Dr. Ed. R. Squibb, strong efforts for inducing me to henceforth continue in this work, but finally approved of my argument for declining, as I then deemed it the greater service I could perform for American pharmacy and the Association by elaborating and offering them a compend on the examination of medicinal chemicals, until then wanting in American pharmaceutical literature.

"Professor Procter used to quite regularly, and always in company with his close friend, Dr. Edw. R. Squibb, attend the annual meetings of the American Pharmaceutical Association, and greatly enjoyed in meeting there old and new friends. They both stood foremost in upholding the ethical standard of the Association and of American pharmacy, and proved at various opportunities uncompromising adversaries of sophistry and empiricism.

"I saw his genial features for the last time when attending his funeral as a delegate of the New York College of Pharmacy on February 14, 1874. At the occasion of a lecture on the application

of the microscope in pharmacy, delivered before the same college on February 12th, it was my sad duty to pay this brief tribute of reverence to the memory of the departed friend:

"'Before commencing the lecture of this evening, I wish to express, in a few words, the profound emotion and grief which the sudden death of our distinguished friend, Prof. William Procter, Jr., has caused among our profession. What Procter has accomplished we all know; what a good and noble man he was, those know best who knew him personally. American pharmacy has been elevated by his guiding hand, and has been largely advanced by his toil and genius. He has been its pilot to purer and higher aims, one of its truest and greatest representatives.' (*Druggists' Circular and Chemical Gazette*, March, 1874, p. 57.)

"Yours truly,

"FRED. HOFFMANN."

"DEAR SIR:—My first recollections of Professor Procter were when he used to come into the store of Charles Ellis & Co., 56 Chestnut Street, where I was an apprentice. He generally had a package under his arm, and walked with a firm, quick step back to the office, nodding pleasantly to us boys.

"Next was his lectures at the College of Pharmacy, on Zane Street above Seventh, preceded by a quiz of those who wished to take it seated in the front rows of benches. He was kind enough to help out the doubtful students by judicious questioning. The lecture itself was always delivered in a clear and distinct manner, well illustrated by specimens and preparations and commanded the respectful attention of the class.

"In those days the examinations for graduation were verbal, and the anxious young man appeared before the Professor and two or more of the Examining Committee of the Board of Trustees, and submitted to the cross-questioning and identification of specimens. Professor Procter was not terrifying, but always kind in manner, endeavoring to put the youth at his ease and get out of him all he knew on the subject.

"At the pharmaceutical meetings, then well attended by Procter, Bridges, the Parrishes, Maisch and many of the younger lights in pharmacy, he was a frequent contributor of very practical papers that were valuable to the apothecary in his everyday business.

"When the trustees were endeavoring to raise funds to pay for the lot on Tenth Street and put up a college building to replace the old one that was too small for the increasing number of students, it was my privilege to canvass with him a section of the city allotted to us. We spent many mornings together interviewing almost every retail druggist in our district, and his presence very largely influenced the cash response to our request, he backing up my remarks with a few judicious words.

"In all our intercourse when on the Board of Trustees together, and as members of the American Pharmaceutical Association, when we attended many meetings together, Professor Procter was the same genial, considerate and cordial friend to the younger members of the profession and to all with whom he came in contact. We had worked together on the revision of the Pharmacopœia of 1860, and, when attending my first meeting of the American Association in New York, he nominated me as Secretary to the august assembly, much to my horror.

"All his old students, many of whom became his fast friends after graduation, will bear me out in the opinion that the 'Father of American Pharmacy' was a most fatherly instructor, unselfish advisor and that rarest of rare beings, a true friend.

"JAMES T. SHINN."

"DEAR SIR:—It is nearly forty-four years since I sat under the teaching of Prof. William Procter. I can hardly say that my acquaintance with the Professor began upon my entering the class, for I had received much instruction from the reading and studying of the 'Practice of Pharmacy,' by Mohr, Redwood and Procter, a copy of which had fallen into my hands some two or three years before my entrance into the College.

"I was quite a young man, from what was then considered the West, and there were very few whose homes were farther west than mine.

"Professor Procter was then in his prime, and his lectures were very instructive—a plain statement of facts and rarely embellished with the flashes of wit that were frequent with Professor Thomas, the lecturer upon materia medica. Professor Procter was dark-complexioned and at that time his hair was the color of the raven's wing.

"I remember one topic upon which he laid especial stress, viz.,

percolation. This process was then in its infancy in this country, and I doubt if any of those who heard him have ever entirely forgotten the directions given. And while pages have been written since upon the subject, there has not been much added to what Professor Procter gave in his lecture.

"His lecture upon the pharmacy of the cinchonas was both interesting and instructive; the same may be said regarding his lecture upon the pharmacy of opium, for be it remembered that at that time really good drugs were very difficult to obtain even in a crude form. And as to powders, the bulk of them were simply horrid. It was this fact that led Procter, Ellis, Parrish and others in Philadelphia to associate themselves with some kindred spirits in New York, Boston and Baltimore, to hold a meeting and organize the American Pharmaceutical Association, which has grown into a power of strength in the world of pharmacy.

"From what I knew of Professor Procter I can readily see him, the leading spirit in the first meeting of this body. I have often thought what would the dear old man think or say could he step into a modern drug store and see the array of ready-made preparations, and peruse a modern prescription file, and see 90 per cent. of the prescriptions calling for some specialty, in whole or in part. He would feel sad, to say the least.

"He was a grand man and there is no one to divide the honor; he was the 'Father of American Pharmacy' indeed.

"GEO. W. SLOAN."

RECENT LITERATURE RELATING TO PHARMACY.

THE ASH OF CINNAMON BARK.

Finding that much of the cinnamon of German commerce (especially that in broken pieces) failed to meet the pharmacopœial requirements as to ash (not more than 5 per cent. of ash with 1 per cent. of sand), G. Rupp (*Süddtsch. Ap. Zt.*, 1899, 267) reports the examination of two packages imported to order.

A package from China was a ball weighing 12 kilos, containing thick fragments of the bark of older branches, the more brittle parts of young shoots and considerable pebbles, sand and dirt. The second package, closely resembling the other, came from Ceylon.

The Chinese bark, ground with its mineral impurities, gave 5·79 per cent. ash with 2·83 per cent. sand; and when freed from pebbles and grit, showed 4·83 per cent. ash with 0·83 per cent. sand. Commercial powder, said to be from same source, showed 6·03 per cent. ash with 3·1 per cent. sand. Commercial Ceylon cinnamon powder showed 6·1 per cent. ash with 2·4 per cent. sand, while the contents of the original package showed 4·92 per cent. ash with 1·06 per cent. sand, when ground with the adhering grit; and 4·4 per cent. ash with 0·6 per cent. sand, when cleaned.

The article closes with remarks of Dr. A. Rau on the difficulty of securing pure cinnamon by reason of practical monopoly possessed by the Chinese. He concludes that the only feasible method of preventing inferior ware from reaching the market is by exclusion, at the custom-house, of all samples below pharmacopœial requirements. H. V. ARNY.

WINE OF CINCHONA.

A careful study of cinchona wine is reported by G. Weinedel (*Ph. Zt.*, 1899, 285). He finds fault with the recipes of the two German pharmacopœias; both products soon depositing a sediment, containing considerable amount of the alkaloids. For instance, one specimen of wine containing, when fresh, 1·82 per cent. alkaloids, after four weeks contained 1·36 per cent., and after sixteen weeks contained 0·48 per cent.

After trying all recipes coming under his notice, he devised the following process, which, he claims, is most satisfactory:

Cinchona, in coarse powder	500 Grammes.

Macerate on water-bath for twenty-four hours with a mixture of:

Hydrochloric acid	30 Grammes.
Water	750 "

Then transfer to a wide-mouthed container and macerate for eight days with:

Alcohol	1,000 Grammes.

Then add:

Sherry wine	10,000 Grammes.
(Or, better, sherry and malaga, each 5,000.)	
Syrup	1,500 "
Syrup of orange	200 "
Citric acid	10 "

Macerate four weeks in cellar and there filter. H. V. A.

SANDALWOOD OIL.

A German house has put on the market a purified product of sandalwood oil, from which, it is claimed, the deleterious constituents of the native oil have been removed.

Their chemists, von Soden and Mueller (*Ph. Zt.*, 1899, 258), report on their product, which they claim is a mixture of, at least, two closely similar sesquiterpene alcohols, of the formula $C_{15}H_{25}OH$, basing their opinion on the fact that different distillation fractions show differing polarization intensity. A separation of the constituents has not yet been accomplished.

In the rejected portion of the oil, the writers find a new sesquiterpene, $C_{15}H_{24}$, which they call santalene.

It is laevogyre, boils at 261°–262°, and has specific gravity 0·898 at 15°. It adds two molecules of hydrochloric or hydrobromic acids or of bromine, the products being not yet obtained in crystalline form. Hydration of the product by method employed by Wallach and Walker with caryophyllene yielded an alcohol, $C_{15}H_{25}OH$, boiling at 160°–165° under 7 millimetres pressure, and differing from the alcohols found in their specialty.

The writers also found in the oil a phenol of unpleasant odor, a lactone, an acid melting at 154° and some borneol.

H. V. A.

ASSAY OF FRANGULA.

In a contribution from the Helfenberger factory (*Ph. Cent.*, 1899, 277), Dr. K. Dieterich discusses Aweng's investigation of frangula (see A. J. P., 1899, 398), the writer assaying the drug, by estimation of its two glucosides by successive treatment with acetone and 60 per cent. alcohol, in an endeavor to decide if the heat of 100° necessary to destroy the griping ferment, lessened the quantity of the two valuable glucosides. Examination of fresh bark and the same heated to 100° for forty-eight hours showed approximately the same amount of glucoside—16·79 per cent. of the acetone soluble glucoside and 17·18 per cent. of the other against 16·16 per cent. and 17·64 per cent. in heated bark—the amount in both being estimated on water-free bark.

From this result, the writer makes the important suggestion that the ageing process now directed (keeping one year) can be replaced by heating to 100° for forty-eight hours. H. V. A.

CONCERNING SOLANIN.

Noting diversity of reports on solanin, relating alike to composition and properties, Cazeneuve and Bretem (*Jour. de Pharm. et Chim.*, 1899, 465) took up the work again.

They obtained the body from fresh sprouts of potato—not longer than 10 centimetres—by mixing these with their own weight of lime, drying at ordinary temperature and extracting with 93 per cent. alcohol. The alcoholic liquid, which was only slightly yellow, was evaporated in vacuo, to a syrup, which crystallized on cooling. The crystals were washed with ligroin and ether and further purified by crystallization from alcohol.

The yield was 0·5 gramme of glucoside from a kilo of sprouts. It melted at 250° (against 240° of Zwenger and Kind and of Kletzinski; 235° of Hilger, and 244° of Firbas). The crystals contained 5·52 per cent. water, and analysis leads the writers to propose as formula $C_{23}H_{47}NO_{10}2H_2O$ (against $C_{43}H_{71}NO_6$ of Zwenger and Kind; $C_{21}H_{35}NO_7$ of Kletzinski; $C_{42}H_{87}NO_{15}$ of Hilger and $C_{52}H_{93}NO_{18}$ of Firbas).

The writers find that it hydrolyzes to a crystalline product melting at 190°, soluble in ether (in which solanin is insoluble), and to a reducing sugar yielding a di-hydrazone. The rest of the article is devoted to correction of tests of identity. H. V. A.

A CONSTITUENT OF XYLEM.

Well known is the reaction in which xylem, and hence all wood products—is colored red by phloroglucin and hydrochloric acid. Czapek (*D. Am. Ap. Zt.*, through *Süddtsch. Ap. Zt.*, 1899, 326) reports successful extraction of the principle producing the color. He takes finely powdered wood, which has been cooked in alcohol, and heats it to 80° to 100° with six times its weight of 15 per cent. solution of tin chloride. The solution is then evaporated, the residue is cooked with benzol, which dissolves the principle, the benzol solution is evaporated and the residue is dissolved in alcohol. The alcoholic solution is freed from admixtures by precipitation with water, and from the weak alcoholic mixture the pure product is obtained by extraction with ether and crystallization from alcohol.

The body has the following color reactions: with sulphuric acid, red-violet; with anilin and thallin sulphates, bright yellow; with

phloroglucin and hydrochloric acid, cherry red to violet; with hydrochloric acid and naphtol, blue-green; with hydrochloric acid and phenol, green. Further investigation is yet to be made, but these preliminaries are enough to disprove the former idea that the xylem reaction was due to vanillin or coniferin. The writer names his product hadromin. H. V. A.

OXIDATION IN EXTRACTS.

The changes in constituents of vegetable extracts are discussed by Dr. Stich (*Ph. Zt.*, 1899, 871). His work was confined to ergot extracts and derivatives, and he found that Kellar's violet ergot reaction is given only by fresh preparations, and not from most commercial extracts, nor from cornutin and ergotinin.

Thinking these negative results were due to oxidation, the writer reduced the several preparations with sodium amalgam, whereupon Kellar's reaction gave striking results. To confirm his theory, he treated those preparations, originally giving Kellar's reaction, with hydrogen peroxide, after which the reaction was not obtained.

The oxidation being proved, the writer attributes it to oxidizing enzymes. H. V. A.

"NEW" METHOD OF PREPARING TINCTURES.

An amusing instance of how little the self-sufficient German knows of pharmaceutical progress on this side of the ocean is seen in an article by A. Schneider (*Ph. Cent.*, through *Ph. Zt.*, 1900, 36). In this, the writer sagely states that pure alcohol or even diluted alcohol is not the proper menstruum for all tinctures and extracts; that ammonia water should be added to the menstruum of glycyrrhiza preparations; glycerin for tannin-bearing drugs, and above all —great novelty—acids for alkaloidal drugs. The only trace of originality shown in the paper is in the suggestion that the acids could be removed from the finished preparation by appropriate precipitants—a method likely to endanger quality of product.

H. V. A.

ANTIDOTE FOR FORMOL.

M. André (*J. Pharm. et de Chim.*, through *Schweiz. Wochenschr.*, 1899, 456) reports an accident in which a woman took a teaspoonful of 40 per cent. formaldehyde solution, producing severe caustic effect. As the theoretical antidote was ammonia (the reaction

being $6CH_2O + 4NH_3 = 6H_2O + C_6H_{12}NH$; the harmless hexamethylenamine being formed), solution of ammonium acetate was administered with the happiest results. About three volumes of spirit of mindererus should be used to counteract one volume of 40 per cent. formaldehyde, and an alkaline mineral water should be given to neutralize the acetic acid liberated in the reaction.

H. V. A.

ANTIDOTES FOR CYANOGEN COMPOUNDS.

The researches of Dr. Meurice, on the use of salts of the heavier metals as antidotes for cyanogen compounds, are reported by M. Heymann (*Bull. Acad. Med. Belg.*, 1899, 564). The poisons employed were potassium cyanide, acetonitrile, lactonitrile, benzonitrile, amygdalonitrile and the nitrile of malonic acid. The antidotes were the nitrate of cobalt and nickel and the sulphates of copper and iron. The subjects were rabbits, pigeons and frogs with the first-named antidote, and rabbits only with the others. The conclusions are: that the action of all nitriles, save benzonitrile, is combated by salts of the heavy metals; that cobalt nitrate is the best antidote, counteracting four times the lethal dose of amygdalonitrile; that the antidotal action of the other salts mentioned above lessen in the order there given. The last conclusion is that the antidotal effect is not entirely due to chemical reaction, since those cyanogen compounds giving the least copious precipitates with the antidotal salts are most strongly counteracted by them. H. V. A.

IODOFORM TEST.

On theoretical grounds, M. G. Denigès (*Bull. Scc. Pharm. Bordeaux*, 1899, 321) devised a test for minute quantities of iodoform, based on formation of fuchsin dyes, when iodoform is treated with aromatic amines. He extracts the iodoform from its mixtures with ether and, after evaporating solvent, he adds three or four drops dimethylianilin, whereupon the liquid becomes a deep brown, and, on warming almost to boiling and adding a little alcohol, the product assumes a violet or red tint, according to amount of iodoform present. The absorption spectrum of the liquid shows the characteristic methyl-violet band, and with a hand spectroscope 0·1 milligramme iodoform can be readily detected. If the iodoform is mixed with a substance soluble in ether like guaiacol, the violet

coloration is hardly discernible, but the spectrum shows the characteristic band.

In conclusion, the writer suggests the method as a colorimetric assay, based on brown color, formed in cold mixture of iodoform and dimethylianilin. H. V. A.

ANALYSIS OF VOLATILE OILS.

A fact noted by M. Duyk (Mem. Acad. Med. Brux., through *Bull. Soc. Pharm. Brux.*, 1899, 350) is likely to prove of value in analysis of volatile oils. He notes that when volatile oils are shaken with a fairly concentrated solution of sodium salicylate, the oxygenated products, such as eucalyptol, geraniol, carvone and citral, are dissolved, while the hydrocarbons separate, thus affording a simple method of separating these two classes of volatile oil constituents. It moreover affords means of detection of terpenes in such commercial products as carvone and eucalyptol. H. V. A.

THE CHEMISTRY OF THE RESINS.

Professor Tschirch gave an interesting address on resins at the last "Naturforscher" convention (*Schweiz. Wochenschr. für Pharm. und Chem.*, 1899, 470). From coniferous resins he separates the characteristic acids by fractional extraction of ethereal solution with dilute ammonium carbonate solution and 0·1 per cent. soda solution and subsequent precipitation of the acids by hydrochloric acid. All the resins yield several acids, mostly crystalline, and different, not only when from different plants, but also according to varying manipulation in manufacture. Thus, the naturally exuding resins, the resins exuding through artificial wounds, and resins prepared by cooking (like colophony) yield a different variety of acid.

Similar to the coniferous resin acids are those yielded by the resins of the natural order Leguminosæ. Of these, the acids from Zanzibar copal and of copaiba have been investigated by the author. Those from the last-named drug were its ethereal solution, with 5 per cent. soda solution precipitated by hydrochloric acid, redissolved in ether and fractionated by successive agitation with dilute ammonium carbonate solution and 5 per cent. soda solution. In this way, five acids were obtained and their chemistry is still being studied by the author. H. V. A.

PHYSOSTERIN IN ANIMAL FATS.

Of late years chemical research has shown that the best test for the presence of cotton seed oil residues in animal fats (like lard) is the isolation and identification of the physosterin crystals found in the cotton seed. It is true that animal fats contain the closely similar cholesterin crystals, but the two can be easily distinguished by a careful observer.

C. Virchow (*Ber. Dtsch. Pharm. Ges.*, 1899, 198) points out the following distinctions: (1) shape of crystals as seen under the microscope; (2) melting points (cholesterin, 144°–146°; physosterin, 136°–137°). In other respects the two substances are similar, both being soluble in the same extraction liquids and showing identical color reactions.

Of the latter, the most striking is the author's modification of the Liebermann cholesterin reaction, which is as follows:

Dissolve substance in smallest quantity of chloroform in a narrow tube, add acetic acid anhydride and shake. Then pour the solution cautiously on a layer of sulphuric acid, when the point of contact colors successively red-violet, blue-violet, indigo, blue-green, green and brown.

The article concludes with a report on examination of the fat of animals whose fatty diet was cotton seed oil only. Despite the fact that the above oil contains physosterin, the fat of the slaughtered animals never showed its presence. H. V. A.

CELLULOSE.

A new contribution to the chemistry of cellulose is an article by Bumcke and Wolffenstein (*Ber. Dtsch. Chem. Ges.*, through *Ph. Cent.*, 1899, 690), who report that oxy-cellulose and hydro-cellulose, instead of being oxidation products, originate through hydrolysis. Treating cellulose with hydrogen peroxide, the authors obtained an oxy-cellulose, evidently formed by the same method of decomposition of the hydrogen peroxide as we see when that oxidizer acts on cane sugar, namely, $H_2O_2 = H_2O + O$, the formed water acting in a nascent state. They call this oxy-cellulose, hydral-cellulose, and find it to be an aldehyde, changing to the alcohol (cellulose) or to the acid (acid-cellulose) under appropriate reagents. Acid-cellulose differs from cellulose by its solubility in cold solution

of soda and from hydral-cellulose by absence of aldehyde properties. It can be formed direct from cellulose by treatment of the latter with Schweitzer's reagent.

The writers then compared the three substances by attempted incorporation of the nitro-group, and they all formed the same nitro-cellulose, which analysis showed to be nitro-hydro-cellulose. Molecular weight estimations pointed to $6C_6H_{10}O_5 + H_2O$ as the formula of hydral-cellulose, while cellulose is $(C_6H_{10}O_5)_{12}$.

To this information von Faber and Tollens (*Ber. Dtsch. Chem. Ges.*, 1899, 2589) add that the above-mentioned oxy-cellulose consists of a combination of cellulose with a derivative, which the investigators call celloxin. This has not been isolated, but its decomposition into iso-saccharic and dioxy-butyric acids, when oxy-cellulose is cooked with water (the cellulose portion remaining unchanged), seems to point to the formula $C_6H_{10}O_6$ or $C_6H_8O_6$. H. V. A.

CHEMICAL IDENTIFICATION OF COTTON FIBRE.

A simple test for cotton based on the conversion of its cellulose into an aldehyde carbohydrate and subsequent application of an aldehyde color test has been devised by E. Jandrier (*Ann. Chim. Analyt*, through *Schw. Wochenschr. für Pharm. und Chem.*, 1899, 489).

It consists in heating 1 gramme of the suspected fabric (after careful washing!) with sulphuric acid, specific gravity, 1·161, on a water-bath for a half hour, diluting to 1 litre; mixing about 2 c.c. of this solution with 0·01 gramme resorcin and pouring into concentrated sulphuric acid, so as to form a separate layer.

At the point of contact an orange ring is formed if cotton is present. Other phenols show similar reaction, the tint being different, however. The reaction shows even when the fabric is colored. H. V. A.

AUTUMNAL CHANGE OF LEAF CONSTITUENTS.

It has been noticed that the leaves of trees have less potassium, phosphoric acid and nitrogen and more silicic acid and lime in the fall than in the early summer, and, concerning the cause, there have been different theories; the last being that the autumnal rains wash the soluble salts out of the leaves. The latest investigators, Tollens and Jucker (*Ber. Dtsch. Chem. Ges.*, through *Pharm. Zt*,

1899, 814), working on the leaves of Plantanus occidentalis, collected from June to November, confirm the original statements as to loss of soluble constituents, but show that the loss is practically identical, whether leaves were protected from rain or not. The investigators, therefore, return to the theory that the soluble salts in the leaves move to the cells of the branches and trunk before the leaves fall. H. V. A.

A NEW ALKALOIDAL REAGENT.

Mecke (*Ztsch. oeffent. Chem.*, through *Suddtsch. Ap. Zeit.*, 1899, 739) recommends a 5 per cent. solution of selenous acid in concentrated sulphuric acid, as giving particularly striking color reactions with the opium alkaloids; yielding, for instance, a distinct green, with 0·005 milligramme morphine or codeine; orange, with 0·002 milligramme thebaine; blue, with 0·1 milligramme papaverine, and blue-violet, with 0·02 milligramme apomorphine.

It is of great value in testing opium galenicals or food remnants for morphine, since in such cases the brown color produced by the concentrated acid does not cover the green tint.

H. V. A.

ELECTROCHEMICAL ACTION OF ROOTS.

The important role played by electrochemistry in all cell functions is emphasized by the researches of R. Kohn (Land. Vers. Station, through *Ph. Zt.*, 1899, 814) on the causes of the acid action of root hairs, a phenomenon noted long since. The writer shows, by pieces of litmus placed at various distances around beet roots, that acid is not emitted by the roots, but that they act as positive electrodes, attracting the acid constituents of the soil and repelling the alkaline ions. H. V. A.

REVISION OF THE GERMAN PHARMACOPŒIA.

In view of the recent pharmacopœial convention in Washington, the report of the German Commission (*Ap. Zt.*, 1899, 679) as to additions to their pharmacopœia is of interest.

They recommend the addition of twenty-five remedies to their present list of officials, namely: Adeps Lanæ Anhydricus, Adeps Lanæ cum Aqua, Æther pro Narcosi, Alcohol Absolutus, Arecolinum Hydrobromicum (the alkaloid of Areca nut), Baryum Chloratum, Bismuthum Subgallicum, Bromoformium, Coffeinum

Natrio-salicylicum, Gelatina Alba, Hydrargyrum Salicylicum, Hydrastininum Hydrochloricum, Mel, Methyl-Sulfonalum, Oleum Camphoratum Forte, Oleum Chloroformi, Oleum Santali, Pilulæ Ferri Carbonici Blaudii, Pyrazolonum Phenyl-dimethylicum Salicylicum (antipyrin salicylate), Semen Erucæ (white mustard seed), Serum Antidiphthericum, Tela Depurata (purified gauze), Tuberculinum Kochi, Unguentum Adepis Lanæ, Vinum Chinæ.

It will be noticed that the two most popular serums are to be admitted, and this step is of great value in the case of the diphtheria serum in attempting uniformity of valuation; four strengths, (0 to III) ranging from 200 to 1,500 "immunization units," being permitted.

The commission recommends a change in description of pomegranate bark (including assay) and changes the formula of sticking plaster by incorporating India rubber. H. V. A.

ARE BACTERIA FUNGI?

In *Centralblatt f. Bakteriologie*, etc., Zweite Abt., Bd. iii, Nos. 11 and 12, Dr. Johan-Olsen argues that bacteria are simply one stage in the development of fungi, and supports his text, Zur Pleomorphismusfrage, with two well-drawn plates. Unfortunately, some of his most striking examples are drawn from species of Oospora which mycologists for many years have classed as fungi, and whose only claim to be classified as bacteria is the fact that when their extremely tenuous hyphæ break up into conidia, or oidia, the latter closely resemble rod-shaped bacteria in size and form. These conidia, however, grow into genuine branched mycelia. Some of the other cases which he cites, *e. g.*, branched tubercle and diphtheria bacilli, may well be involution forms, as Dr. Migula has suggested, since they are usually found only in old cultures, sparingly, and under conditions unfavorable to the organism. More difficult to explain is his account of the change of the mycelium of *Dematium casei* into bacteria bearing endospores, the germination of which spores he succeeded in witnessing. Possibly Dr. Ol. Johan-Olsen was working with mixed cultures. Much is said of Dr. Brefeld's *System*, but if Dr. Johan-Olsen's culture methods are not a very decided improvement on those of his master, which have been described to me in recent years by a number of people who have studied at Munster, and which are certainly very crude, then we

are fully warranted in calling in question the results. One is the more inclined to do this because in another paragraph we are told that: "Almost all bacteria which I have had in cultivation in recent years form a branched mycelium in course of time, especially all bacilli." We are also rendered suspicious by the statement that species of Aspergillus and Mucor may appear in the form of amœba. It is possible, of course, that bacteria are only "incompletely known fungi," but up to this time the evidence is certainly not very conclusive, and to the writer it seems not at all improbable that they may have had quite a different origin, at least many of them.—Erwin F. Smith, in *The American Naturalist*, Vol. XXXIII, p. 169.

POISONOUS GRAINS.

It has long been believed that the fruit of *Lolium temulentum* is poisonous, and chemists have had something to say about its toxic principles. In the *Journal de Botanique* for August M. Guérin publishes an article embodying the results of a study made at the École Supérieure de Pharmacie of Paris, in which he records the constant occurrence of fungal hyphæ in the nucellus of the ovule and the layer of the caryopsis lying between the aleurone layer and the hyaline portion of the wall. These hyphæ, which appear not to have been identified with any fruiting form, are referred to as, perhaps, the cause of the toxicity of the Loliums in which they occur (*L. temulentum*, *L. arvense* and *L. linicola*), and they are stated not to have been found in *L. italicum*, and only once in *L. perenne*. The fungus is compared with *Endoconidium temulentum*, Pril. and Delacr., found in diseased grain of the rye, and believed to be the cause of some of the cases of poisoning attributed to that grain, though it is believed to differ from the fungus named, and the conclusion is reached that, unlike this species and Claviceps, it lives in the maturing grain symbiotically rather than as a parasite.—Abstract in *ibid*, p. 171.

THE CHEMISTRY OF STROPHANTHUS.

The only strophanthus preparation included in official pharmacopœias is the tincture prepared from the seed of *Strophanthus kombé*, Oliv., according to some pharmacopœias, or from the seed of *S. hispidus*, D. C, according to others, and it is stated that the residue of the evaporated tincture gives with sulphuric acid a green coloration.

Great hopes of this remedy were for some time entertained, because it did not produce the disagreeable effects of digitalis, but it has fallen into discredit, since the tincture met with in commerce proved to be of very unequal activity.

The causes of this objection are now clearly recognizable, and they explain the disinclination of medical men to use the drug. The essential point is the use of a pure glucoside of known activity, and my object is to direct attention to strophanthin as the substance which, on account of its great solubility in water as compared with the glucosides of digitalis, is more readily absorbed, and is, therefore, more prompt in its action.

	Strophanthin.			Pseudo-strophanthin.		
Description Given.	Fraser. Hisp. var. Kombé.	Böhringer. Kombé.	Schuchardt. Hispidus.	Arnaud. Kombé, or Hispidus.	Kohn, Kulisch. Hispidus or Kombé?	Merck (Kohn). Hisp.
Color of seed used	Greenish-white	Pale green	?	Green	Green	Brown
Seed with H_2SO_4	?	Green	?	?	Green	?
Glucoside with H_2SO_4	Green	Green	Red	?	Red	Red
Formula	—	$C_{40}H_{66}O_{19}$	—	$C_{38}H_{58}O_{16}$ =	$(C_{40}H_{60}O_{16})$	—
Melting point	172°-175°	170°	167°	165° about	179°	179°
Optical rotation	—	1 p. c. solution none 5 p. c. = + 10°	—	$[a]D = +3c°$	Minimal left	—
Hydrolysis with	1 p. c. HCl at 50°-60°	0·5 p. c. HCl at 70°-75°	0·5 p. c. HCl at 70°-75°	—	2·4 p. c. HCl at 100°	—
Yield of strophanthidin or ψ-stroph.	0·3 p. c. H_2SO_4 65°-70° 33·7	— 50-52	—	—	— 52·5	—
Melting point	—	169°-170°	—	—	195°	195°
Formula	—	$C_{27}H_{38}O_7$	—	—	$C_{28}H_{40}O_8$ or $C_{19}H_{28}O_4$	—
Lethal dose per kilo rabbit, subcutaneous injection	—	0·00c6	0·0006	0·00025	—	0·003

Among the circumstances which have to be considered as influencing the medicinal value of the tincture, the uncertainty as to the source of the seed used is a considerable one, as has been shown by many observers. Still more important than the circumstance that while some seeds contain strophanthin others do not, is the exist-

ence of different strophanthus glucosides; the one isolated by Fraser differs from that isolated by Arnaud, the two substances differing chemically and in toxic power.

Strophanthin was obtained by Fraser from the green seed of *S. kombé*, but whether it exists in other kinds is still undetermined. The other glucoside obtained by Arnaud subsequently investigated by Kohn and Kulisch, now known as pseudo-strophanthin, certainly exists in several kinds. Arnaud prepared it from seed (probably green) supplied by T. Christy as *S. kombé*. The green seed used by Kohn was certainly not that of *S. hispidus*, and Merck manufactures the same glucoside from brown seed (*S. hispidus*). This difference accounts for the discrepancies observed in the effects of strophanthin and strophanthus tincture.

It is, therefore, necessary to establish the difference between strophanthin and pseudo-strophanthin.

The strophanthin used in my experiments was prepared by C. F. Böhringer & Son, of Waldhof, according to Fraser's method. It was quite pure and free from pseudo-strophanthin, and presented all the characters described by Fraser.

In comparing strophanthin with pseudo-strophanthin the account given of the latter by L. Kohn was relied upon, as well as his statement that the glucoside he prepared was identical with that of Merck, and agreed with Arnaud's description, except in its optical characters.

The investigation of the toxic effects of strophanthin and pseudo-strophanthin was carried out by Dr. Höber. The ψ-strophanthin of Arnaud was examined in this respect by Gley, who found it to be nearly twice as active (about 5 : 3) when applied subcutaneously as strophanthin, costing three to four times as much.

The necessity of distinguishing between strophanthin and pseudo-strophanthin is evident; that should be done in the pharmacopœias and in labelling the commercial articles, and it may even be necessary in every instance to state on the label the lethal dose per kilo.

The composition of strophanthin in the anhydrous state is represented by the formula $C_{40}H_{66}O_{19}$. Kohn and Kulisch give as the formula of dried pseudo-strophanthin either $C_{31}H_{48}O_{12}$ (Arnaud), $C_{30}H_{46}O_{12}$, or $C_{38}H_{58}O_{15}$, the latter being most in accord with the amount of methoxyl. Calculated for 40 carbon the formula would

be $C_{40}H_{60}O_{16}$, which agrees with the data of analysis, and still better with the methoxyl amount.

	Found (Kohn).	$C_{38}H_{58}O_{15}$.	$C_{40}H_{60}O_{16}$.
C	60·24-60·89	60·47	60·30
H	7·54- 7·82	7·79	7·55
CH_3O . .	3·4 - 3·77	4·11	3·89

Accordingly, strophanthin differs from pseudo-strophanthin by containing three molecules of water more. Both substances contain one methoxyl group; but while that of strophanthin is found, on hydrolysis, in the carbohydrate product, that of pseudo-strophanthin is retained in the ψ-strophanthidin. The hydrolysis in each case may be represented by the following equations:

Strophanthin. — Strophanthidin. — Strophanthobiose-methyl-ether.

$$C_{40}H_{66}O_{19} = (C_{27}H_{38}O_7 + 2H_2O) + C_{12}H_{21}O_{10}CH_3$$

Pseudo-strophanthin. — ψ-Strophanthidin. — Saccharobiose (not yet isolated).

$$\left.\begin{matrix} C_{40}H_{60}O_{16} \\ H_2O \end{matrix}\right\} = C_{27}H_{37}O_6.CH_3 + C_{12}H_{22}O_{11}$$

Accordingly, pseudo-strophanthin would be the methyl ether of a substance $C_{29}H_{38}O_6$ containing one oxygen atom less than strophanthidin. Those substances would, therefore, have the same relation to each other as methoxybenzene and dioxybenzene:

Strophanthin and pseudo-strophanthin differ in melting point, their optical rotation, as well as in the coloration they give with sulphuric acid. A sample obtained from Schuchardt gave a red color with sulphuric acid like ψ-strophanthin, though in other respects it perfectly resembled the strophanthin giving a green coloration, and that may have been due to the preparation being old. Some years ago the observation was made that old seeds which had formerly given a green coloration with sulphuric acid had, after keeping, given a red coloration. Perhaps the isolated glucoside may be liable to a similar alteration, though the specimens I have had for three years still continue to give the green color.

A further difference between the two glucosides is apparent in the hydrolysis caused by acid. By slowly warming strophanthin with

dilute hydrochloric acid (1 in 200), the alteration takes place readily and the full amount of strophanthidin separates suddenly in fine needles. On the contrary, pseudo-strophanthin requires much stronger acid, which must be heated to the point boiling before the insoluble product of alteration begins to separate in flocks.—Franz Feist, in *Apotheker Zeitung*, XV, 469; through *Pharm. Jour.*, 1900, p. 314.

PHILADELPHIA HOSPITAL FORMULARY.

(*Continued from page 437.*)

SYRUPI.

Syrupus Hypophosphitum Cum Ferro.

Each teaspoonful contains:

Ferrous Lactate	1 gr.	0·065 gm.
Acid, Lactic	2 m.	0·12 c.c.
Syrup, Hypophos., to measure	1 fl. dr.	4 c.c.

Dose: One or more teaspoonfuls.

Philadelphia Hospital.

Syrupus Potassii Iodidi.

Each teaspoonful contains:

Potassium Iodide	10 gr.	0·6 gm.
Syrup, Sarsap. Comp., to measure	1 fl. dr.	4 c.c.

Dose: One to two teaspoonfuls.

Syrupus Potassii Iodidi Compositus.

Each teaspoonful contains:

Potassium Iodide	10 gr.	0·6 gm.
Mercuric Chloride, Corrosive	$\frac{1}{24}$ gr.	0·003 gm.
Syrup, Sarsap. Comp., to measure	1 fl. dr.	4 c.c.

Dose: One to two teaspoonfuls.

Syrupus Quininæ

Each teaspoonful contains:

Quinine Hydrochlorate	2·5 gr.	0·15 gm.
Ac. Hydrochlor., Dil.	1·25 m.	0·075 c.c.
Glycerin	7·5 m.	0·45 c.c.
Syrup	22·5 m.	1·3 c.c.
Water, Chloroform, to measure	60 m.	4 c.c.

Dose: One to four teaspoonfuls.

TINCTURÆ.

Tinctura Digitalis.

(Fat-free.)

Each teaspoonful represents:

Powdered Digitalis (Fat-free)	8·5 gr.	0·55 gm.
Water, Ammonia, sufficient.		
Diluted Alcohol, to measure	1 fl. dr.	4 c.c.

Fat-free Digitalis is made by exhausting the ground leaves with petroleum benzin to remove fat, etc., and drying the residue thoroughly to remove traces of benzin odor. The fat-free tincture is made from the fat-free digitalis by percolating with diluted alcohol to exhaustion and neutralizing free fatty acids in percolate with sufficient water of ammonia. Lastly, sufficient menstruum is added to percolate to make the necessary volume.

Dose: 10 to 30 minims.

J. W. E.

Tinctura Piperis Nigri.

Each teaspoonful represents:

Powd. Black Pepper	4 gr.	0·25 gm.
Alcohol, to measure	1 fl. dr.	4 c.c.

Dose: 15 to 60 minims.

UNGUENTA.

Unguentum Album.

Zinc Oxide	30 gr.	2 gm.
Alcohol	1 fl. dr.	4 c.c.
Oil, Castor, to measure	1 fl. oz.	30 c.c.

Hornor.

Unguentum Balsami Peruviani.

Balsam, Peru	1 dr.	4 c.c.
Petrolatum, to make	1 tr. oz.	30 gm.

Unguentum Hydrargyri Ammoniati.

Mercury, Ammoniated	48 gr.	3 gm.
Glycerin	30 m.	2 c.c.
Cerate, to make	1 tr. oz.	30 gm.

Philadelphia Hospital.

Unguentum Ichthyol.

Ichthyol (Am.)	1 dr.	4 gm.
Cerate	7 dr.	26 gm.

Unguentum Mauri.

Powd. Rhubarb	30 gr.	2 gm.
Powd. Opium	30 gr.	2 gm.
Oint. Mercuric Nitrate	1 dr.	4 gm.
Petrolatum, to make	1 tr. oz.	30 gm.

Maury.

Unguentum Petrolati Carbolatum.

Acid, Carbolic	30 m.	2 c.c.
Glycerin	30 m.	2 c.c.
Petrolatum, to make	1 tr. oz.	30 gm.

Unguentum Zinci Carbolatum.

Acid, Carbolic	30 m.	2 c.c.
Glycerin	30 m.	2 c.c.
Ointment, Zinc Oxide, to make	1 tr. oz.	30 gm.

EDITORIAL.

THE PEOPLE AND THE PHARMACOPŒIA.

There are some pharmacists who would be content to have the Pharmacopœia contain only those preparations or similar ones which they with the facilities at their command a generation ago could make. On the other hand, there are those who would have the Pharmacopœia contain all those substances and preparations which from "hear so" and "say so" are being prescribed. One class would keep the book too far behind the times and the other make it unsafe for the times.

All those who have followed the evolution of the Pharmacopœia must recognize that the scope of the work is changing from a more or less uncertain volume without clearly defined principles to one of a definite purpose. This evolution has depended in a measure on the progress in the sciences as well as in medicine. While certain physicians may still use "shot-gun" prescriptions, the more discerning of them utilize few remedies, adjusting them in doses and combinations to suit the patient. The newer medicine has to do with definite substances rather than mixtures, and it is evident that the Pharmacopœia must follow in the direction of more exact medicine as rapidly as the province is outlined and the principles established. But what is to become of the mixtures and drugs which, though less prescribed, are still used by the common people as well as by some physicians?

E. M. Holmes, in his Presidential address before the British Pharmaceutical Conference (see *Pharm. Jour.*, 1900, p. 125; also this JOURNAL, 1900, p. 440), makes some pertinent remarks on this subject of the people being, to a certain extent, their own physicians. He says:

"There is no law to prevent a man, however ignorant he may be, from prescribing remedies for himself, his friends or his household, and it has been stated on high medical authority that it would not be objectionable for persons to apply at a pharmacy for simple remedies for toothache, muscular pain or trifling dyspeptic ailments, provided the person seeking relief knew what he was about and was not deceived by the assumption of an authority or of titles on the part of the chemist, and provided that such relief was merely to be regarded as first aid or a temporary expedient for a definite complaint stated by the patient."

While it is evident that it is dangerous for the people, generally speaking, to take their lives, when in ill health, in their own hands, still it must be admitted that much of the knowledge of medicine is empirical and has come to us by virtue of the experiences of people (for generations back) who did not understand the action of drugs, but who found out in nature's own way how to alleviate their sufferings and cure their ills. There is much practical medicine still in the heads of certain classes of people who use their common sense. They still go to the apothecary or herb vendors of the markets for sassafras, boneset, mandrake, etc., and when the baby has colic give it soda-mint, Dewee's carminative, etc.; and when a muscle aches a liniment will be had of the apothecary. So far as we know, they seem to be as well off as the patient loaded down with calomel or salicylates, or the baby dosed with chalk-mixture, etc. Nature seems to have been the great restorative, correcting the ills of the body and the abuses of medicines. People will, in a measure, continue to order their own medicines, and if the Pharmacopœia does not contain the important time-honored and tried medicines in its pages there should be some one book which should take cognizance of these drugs and preparations as rapidly as they are discarded by the Pharmacopœia. It is not sufficient to say that *other* books will contain descriptions of these medicaments and the proper formulæ, as it is well known there are books and there are books. Very recently a work by a physician and teacher in a medical school, which contained such information as the following, was reviewed in this JOURNAL: "Taka-diastase, a ferment produced by the action of Japanese rice fungus; used as a disinfectant." Fortunately, the National Formulary has arisen in the United States, and promises to be the authorized *vade mecum* of all drugs and preparations that have been useful in their day in the hands of the intelligent medical practitioner and which have been replaced by substances far more efficient in his hands, but which are still largely used by the common people as well as by some physicians. While the Pharmacopœia will doubtless contain such information as assures uniformity in the more important drugs and substances employed in medicine by the intelligent physician, the National Formulary should become the authorized volume to insure to physicians as well as the public drugs of nearly uniform kind and preparations of nearly uniform composition that are still largely used, but

which for one reason or another are not in the Pharmacopœia. Medicines concern not only the physician and apothecary, but the people even more directly, and the development of the National Formulary should be in the interests of the people who will not only call upon the physician, but who will continue to "doctor" themselves. It would be well, therefore, if as pharmacopœial principles shape themselves, the scope of the National Formulary be increased and its influence extended so that apothecaries can supply according to some established standard the non-pharmacopœial drugs and medicines which some physicians may prescribe or the people order.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

THE OIL-CHEMIST'S HAND-BOOK. By Erastus Hopkins, A.M., Chemist in charge of U. S. Laboratories, Boston. New York: John Wiley & Sons.

The title of this book is not quite exact in its reference to the subject-matter treated. It is only when we open at Chapter I that we meet the statement "fixed oils and fats are here considered; the hydrocarbon oils are considered only so far as they enter into combinations with fixed oils and fats as adulterants." The petroleum refiner or chemist specially engaged in the mineral oil industry ordering the book by title would naturally feel disappointed on opening it and finding the statement quoted.

The book is made up of two parts—a series of tables, giving the physical and chemical constants of the fixed oils, fats and waxes, and descriptions of the physical and chemical methods for the analysis of these materials. The first of these parts is much the most valuable portion of the book, as the author has gathered with great industry, and, as far as we have had occasion to compare, with accuracy, such analytical figures with regard to the oils as can be put in tabular form. The tables cover also quite an amount of information such as statements as to source of oils, process of manufacture, characteristic tests, adulterations, uses, etc., of course in very condensed form.

The second part of the book, that describing methods, suffers from the effort at condensation, and in some sections is far from being full enough for satisfactory working. If the corresponding

sections in Lewkowitsch's "Chemical Analysis of Oils, Fats and Waxes" be referred to this will be easily shown. The new edition of Allen's "Commercial Organic Analysis" also is much more satisfactory in this respect.

The book, however, contains a vast amount of useful information, compactly presented and conveniently arranged in tabular form. It will no doubt fill the author's claim that it will be a very useful, handy book for reference in examining the fixed oils and fats.

S. P. S.

THE VOLATILE OILS. By E. Gildemeister and Fr. Hoffmann. Written under the auspices of the firm of Schimmel & Co., Leipzig. Authorized translation by Edward Kremers. With four maps and numerous illustrations. Milwaukee: Pharmaceutical Review Publishing Company. 1900. $5 net.

The American edition contains all the valuable features of the original German edition, which was reviewed in this JOURNAL, 1899, p. 439, and, in addition, the translator has brought the book up to date. Dr. Kremers' continued work on the volatile oils has rendered him particularly competent to undertake the translation.

The contents of the work are distributed as follows:

I. Historical Introduction: The spice trade in antiquity and during the Middle Ages; history of volatile oils; history of the methods of distillation and of distilling apparatus.

II. General Part: The theoretical basis for obtaining volatile oils by steam distillation; the more commonly occurring constituents of volatile oils; the examination of volatile oils; list of plants, arranged according to families, from which volatile oils are obtained. Special Part: History, origin, preparation, properties, composition, examination and commercial statistics of the volatile oils. The Bibliographical Notes have been placed in an appendix. A comprehensive Index completes the volume.

The volatile oils represent a group of plant constituents of peculiar interest to the apothecary as well as pharmaceutical or manufacturing chemist, and it is extremely fortunate that there is a comprehensive authentic work in English bearing on this subject.

PRACTICAL URINALYSIS AND URINARY DIAGNOSIS. A Manual for the Use of Physicians, Surgeons and Students. By Charles W. Purdy. Fifth revised and enlarged edition. With numerous illus-

trations, including photo-engravings, colored plates and tables for estimating total solids from specific gravity, chlorides, phosphates, sulphates, albumen, reaction of proteids, sugar, etc., in urine. 6x9 inches. Pages xvi–406. Extra cloth, $3 net. F. A. Davis Company, publishers, 1914–16 Cherry Street, Philadelphia.

In addition to the present edition being a revision of the fourth edition, it contains a new chapter on the microscope and its use in urinalysis, and the author has extended the range of centrifugal analysis so that it includes more complete as well as practical data for urinary work. The chemical portion of the work has been carefully revised, a few quantitative methods have been added where previously omitted, and nearly the whole subject of testing albumen in the urine has been rewritten.

This may be said to be one of the most valuable practical works on urinalysis, and while of peculiar interest to the physician, it ought to be in the hands of those pharmacists who conduct analyses of this nature. The relation of the chemistry of the urine to physiological processes and pathological facts is prominently set forth, so that in dealing with normal urine each constituent is considered as follows: Its chemical nature and composition; its source in the economy; the significance of its increase or decrease in the urine, with the relations of these to metabolic processes, food supply, physical surroundings, and tendency toward disease; and, finally, the most approved methods of its detection and determination have been described. In considering the morbid constituents in abnormal urine, their chemical nature and composition, source in the economy, chemical significance of appearance in the urine, the most approved methods of detection and determination are described. A valuable chapter on the subject of urinary examinations for life insurance is added.

COLLEGE ANNOUNCEMENTS.—The following announcements have been received: Albany College of Pharmacy, the Brooklyn College of Pharmacy, California College of Pharmacy, Cleveland School of Pharmacy, Illinois College of Pharmacy, Massachusetts College of Pharmacy, Minnesota University School of Pharmacy, Ontario College of Pharmacy, St. Louis College of Pharmacy, Vanderbilt University, Department of Pharmacy.

The following changes are announced in the Buffalo College of Pharmacy: Edward J. Kiepe, formerly Instructor in Materia Medica, has been elected Professor of that branch; Albert P. Sy has been elected Instructor in Chemistry, and Willett H. Mosher returns as Instructor in Pharmacal Assaying.

NATIONAL ASSOCIATION OF RETAIL DRUGGISTS.

The second annual meeting of the N.A.R.D. was held in Detroit, Mich., September 12–14, 1900. According to the *Pharm. Era*, 1900, p. 307, "the Association makes no very great departure from its former policy, but it reaffirms with greater insistence its desires and purposes. The various reports of the officers and committees show that much has been accomplished during the past year, and these gentlemen hold out sanguine hopes for the future."

The Committee on Trade-marks and Patents reported through its chairman, John C. Gallagher, that they had embodied their views of the existing defects in the present trade-mark and patent laws in a paper which they had forwarded to the members of the Commission appointed by President McKinley to revise the patent and trade-mark laws of the United States. The substance of the objections to the present laws as presented is as follows:

(1) Of the patent laws in that they grant (*a*) monopolies on the drug itself, thereby stifling invention and encouraging exorbitant prices; (*b*) too liberal concessions to foreigners; (*c*) their laxity.

(2) Of the trade-mark laws in that they grant (*a*) trade-marks on the name of the article.

(*a*) The present patent laws are supposed to grant a limited monopoly to the inventor, as a reward for the new good that his ingenuity and labor have conferred on the people at large; often this reward is out of proportion to the deserts of the inventor, for, by granting letters-patent on the article itself and not on the process of manufacture only, we stifle the inventive energy of this country, and deprive the community of the additional benefit that would thereby accrue by reason of the cheapness and improvement of the article itself, through the discovery of improved and more economic methods of manufacturing; hence, the monopoly is too extensive and stimulation of personal greed results as opposed to the general good. The classes and not the masses are directly and indirectly benefited, exorbitant prices are demanded and exacted. An illustration of this fact may be adduced from the well-known medicinal remedy, antipyrine, which, when under the protection of our patent laws, that throw too many safeguards around the article instead of the process of manufacture, retailed for $1.50 an ounce; after expiration of the patent the same article may be bought for 18 cents an ounce.

(*b*) Foreign countries, viz., Argentine, Austria, Belgium, Bolivia, Denmark, France, Germany, Hungary, Italy, Japan, Norway, Portugal, Russia, Sweden, Turkey, Uruguay, do not grant patents on medicinal preparations and chemicals; some grant the patent on the process only—not on the product; surely our country, which makes the proud boast of encouraging and protecting home industry, should not be less solicitous of its citizens' welfare than the countries already enumerated are. Some of these countries compel the inventors as a

condition upon which the patent is granted to manufacture the article within the confines of the country that grants the letters-patent; we do not, and the result is that an article patented in this country may be manufactured in another country, and imported, much to the detriment of our home industries. Here again the general good is ignored and private gains augmented. Protection to other industries has produced such good results that to-day they are exporters instead of importers, while in the drug industry the opposite obtains, owing to the fact that our government grants by the present patent laws more concessions to foreign countries than they will give to us.

(*c*) It is a notorious fact that many letters-patent are granted on drugs and chemicals that cannot substantiate their claims of conferring additional good on mankind. This is due to the laxity of our present patent laws, and owing to the failure of proper investigation and experimentation being instituted to attest these claims, the average time given to the consideration of an application is not sufficient to fully establish the merits or demerits of the invention.

The remedy we desire is: (1) That adequate time be given to investigate the merits claimed by the inventor, so as to demonstrate that it is novel, and thereby confers additional good on the country at large. (2) Patents should be granted on the process only—not on the product. (3) Articles made according to the process patented must be manufactured in this country. (4) No foreigners be granted greater privileges in this country than is given to them by their own. As an alternative for (2), we desire that the revised patent laws forbid the granting of letters-patent of medicines as the term is understood in the art of healing.

Trade-Marks.—The predominant iniquity of our present trade-mark laws is that they secure to the owner a too exclusive right to the name of the article. This name might be a word coined by him, or one or a combination of two or more words in ordinary usage; they allow possessors of patents to continue the life of the monopoly granted by the letters-patent by claiming a perpetual protection by reason of their registered trade-mark or trade-marks.

Remedy.—(*a*) No trade-mark be granted on a name or combination of names coined or otherwise. (*b*) That the trade-mark rights be confined entirely to brands, symbols, signs and devices.

The following officers were elected:

President, W. C. Anderson, Brooklyn, N. Y.; First Vice-President, James W. Seeley, Detroit, Mich.; Second Vice-President, Jesse L. Nelson, Jackson, Tenn.; Third Vice-President, Frank L. Way, Manchester, N. H.; Secretary, Thos. V. Wooten, of Chicago; Treasurer, Chas. T. Heller, of St. Paul, Minn. Executive Committee, F. E. Holliday, Topeka, Kan.; D. E. Prall, Saginaw, Mich.; Simon N. Jones, Louisville, Ky.; Alfred DeLang, Cincinnati, O.; A. Timberlake, Indianapolis, Ind.; Jas. C. Perry, Philadelphia, Pa.